Where Do Financial Markets Come From?
Historical sociology of Financial Derivatives Markets

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Declaration

This thesis and the evidence presented in it are the author's own work. All references have been duly listed

Signed.....

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Abstract

The thesis describes and analyses key events in the history of the pioneering markets for financial derivatives, paying particular attention to the influence of the Black-Scholes mathematical options pricing model on the formation of the markets. The historical narrative, focusing chiefly on the Chicago Board Options Exchange (CBOE), describes the transformation that markets for agricultural commodities underwent as organised trading in financial options was designed and practiced. Drawing on theoretical frameworks from economic sociology and from the sociology of science and technology, the thesis aims at expanding the explanatory scope of sociological accounts on markets. The work presents a new perspective for the understanding of today's financial markets: a multifaceted analytical description that combines the social, regulatory and organisational aspects of these institutions.

After an introductory chapter, a literature review and a discussion of methodology, the empirical material of the thesis is presented in four chapters. Chapter 4 describes the regulatory approval of CBOE. The chapter examines the initial stages in the development of derivatives markets and analyses the effect that the Securities and Exchange Commission (SEC), the American financial regulator, had on the socio-cultural process through which financial markets evolve. The analysis shows that the entrepreneurial setting in which derivatives contracts were situated allowed regulators to use them as a source for political power. Chapter 5 reveals the influence that the culture of the Chicago agricultural commodities markets had on the formation of the financial options market. The case describes the cultural roots of the competitive market maker concept, and the part that this concept played in the introduction of the Black-Scholes options pricing model to the organisational structure of derivatives' exchanges. Chapter 6 is devoted to a detailed description of the practices through which the Black-Scholes model was incorporated into the organisational infrastructure of the options market. This process, as the chapter shows, played a significant part in the construction of the model's validity and credibility. Chapter 7 focuses on the inter-agency regulatory struggle through which index-based derivatives were conceptualised and approved. Building on the cases analysed in the four chapters, the discussion part of the work presents and illustrates the concept of techno-social market networks – the interrelated socio-technical institutions within which price-constructing mechanisms are maintained and operated.

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Chapter 1

Introduction

Organised markets for the trading financial derivatives products are arguably the single most influential economic phenomenon of our time (Steinherr 1998; Izquierdo 2001). The use of derivative products has become a standard practice in the financial world and today banks, pension funds, insurance companies and even states hold portfolios that include extensive derivatives positions. In fact, derivatives have become such an indispensable feature of the global financial system that it would be safe to say that there are millions in the western world who own, either directly or indirectly (even unknowingly), derivative products.[1] Arguably, in the last 20 years the importance of financial markets grew beyond the economic implications of trading in them. Financial markets in general, and derivatives markets in particular are considered to be among the most prominent manifestations of globalisation and at the same time one of the leading forces behind this process (Sassen 2002).

Although the scale and the implications of the operations that take place in financial markets are indeed global, the markets themselves are located within particular sets of social, political and organisational influences.[2] This work traces the development of one of today's important markets for financial derivatives, the market for stock options, and explores the cultural and political background from which this market evolved. Understanding the nature of the process through which the early markets for financial derivatives came to be can help us to identify the local and the circumstantial within the global and thus to gain a better perspective on the financial aspects of globalisation. The detailed empirical analysis that the thesis offers shows that many of the features that are now part of the standard organisational infrastructure of derivatives markets evolved originally under a particular set of circumstances. Consequently, the

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[1] Institutional investors like pension funds, for example, hold derivatives in their portfolio.
[2] Knorr-Cetina and Bruegger (2002), who studied currency traders in a Swiss investment bank, referred to this aspect of financial markets and labelled them as 'global microstructures'

analysis shows, organisational constructs that have grown to become integral parts of today's derivatives markets, like mathematical risk management and index-based contracts bear the marks of the local cultures from which they originated.

This study of the development of financial options markets can also help to establish the relative importance of derivatives markets in the grand narratives of modernity and capitalism. A quick chronological examination of the development of financial markets would show that while securities markets have existed for centuries, organised exchanges for the trading of derivatives have developed only in the last 30 years. As such, it can be claimed that financial derivatives markets are representatives of Giddens' "high modernity" (1990). Similarly, the fact that a central feature of financial derivatives is their capacity to quantify, distribute, and manage risk can serve as and another example to the argument that we now live in a 'risk society', where risks are different substantially from the ones that were known a generation or two ago (Beck 1992). This thesis explores in detail the various transformations that underlined the evolution of financial options markets and shows that the financial world did go through a remarkable conceptual, organisational and political change because of the emergence of organised options trading. Nevertheless, the detailed empirical account of the circumstances that surrounded the development of options markets shows that as revolutionary as these markets were, they still maintained strong connections to the agricultural markets of the Midwest of the 19th century, as well as to the values that were forged in American society after the 1929 financial crash. Thus, as the thesis shows, tradition and ideology did not disappear from derivatives markets, one of the epicèntres of global modernity, but instead became embedded into their material and organisational infrastructure.

This perspective about the development of financial derivatives markets is related to the approach that the thesis applied to the study of these social institutions. David Stark (2000) refers to a boundary line that divided the disciplines of economics and sociology. According to Stark, the establishment of that dividing line should be attributed to the fact that Talcott Parsons agreed to

leave the study of the internal workings of markets to economics. In contrast, in the last few decades economic sociologists transgressed the Parsonian boundary and began to offer sociological explanations to the structure and operation of markets.[3] Although this development did expand the scope of the sociological inquiry remarkably, it seems that the ghost of the Parsonian agreement still haunts today's economic sociology. When the new economic sociology, as it became to be known (Swedberg 1997), approached the subject of markets, many of the studies focused on the section of the markets that had previously been the heart of the 'forbidden zone' to sociologists – trading. Trading, being the central part of the process through which prices are determined is indeed the heart of the markets. Yet, by focusing exclusively on the heart, economic sociology has neglected other parts in the body of the market. Alternatively, the approach that is used in the thesis does not focus mainly on the traders, but studies all of the participants in the process of the development and the operation of the markets. This approach sees actors such as the financial regulators and the staff of the exchanges as playing roles that are as important to the shaping of the markets as those of the traders. By considering the various impacts that the different market participants had on the historical process, the thesis refers to the organisational, political and technological[4] aspects of the markets, and as a result produces a holistic account of their evolution.

The historical analysis of financial derivatives market in this thesis revolves around the evolution of the first organised exchange for the trading of stock options, Chicago Board Options Exchange (CBOE), established in 1973. The narrative describes important events in the evolution of the exchange, and financial derivatives markets in general, starting in the late 60s, with the initial proposal to trade stock options and ending in the early 90s, when index-based options and risk assessment methods that use mathematical pricing models have become standard features of the markets. The structure of the thesis is as follows.

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[3] Chapter 2, which discusses the relevant literature, provides a detailed description of the various concepts represented in this sociological trend.

[4] The thesis will not, however, discuss matters such as the implementation of specific technological systems. Important and fascinating though this is, limits of time and word length prevent me dealing with them in any detail. For a thorough empirical review of financial technology see (Fincham, Fleck, Procter, Scarbrough, Tierney, and Williams 1995)

After this introductory chapter, chapter 2 reviews the relevant literature and develops a theoretical framework that the thesis uses for the analysis of the empirical material. This chapter is followed by a discussion of the methodology of the thesis (chapter 3). After a description of the research methods, this chapter discusses the particular characteristics of financial markets as a subject for social research and the implications of these characteristics on the nature of the material collected. Chapter 4 describes the conditions that surrounded the development the concept of organised options trading and then the events that led to the regulatory approval of the new exchange. The chapter presents the different worldviews and the interests of the commodities and securities exchanges, as well as those of the American financial securities regulator, the Securities and Exchange Commission (SEC). Following this presentation, the chapter focuses on the interactive process in which the values and the norms of various actors were translated into organisational structures of the new market. Chapter 5 describes one of the implications of the translation of values into the organisational structure of the options market – the creation of the competitive market maker. The chapter shows how this translation led to an attempt to recruit a non-human actor, a calculative procedure based on the Black-Scholes model, to the network of connections between the exchange and the regulators. Chapter 6 provides an analysis of the development of risk assessment and risk management practices in the options market. This empirical analysis follows the gradual convergence of social, organisational and technological elements, which led to formation of a techno-social network in options markets. Chapter 7 analyses the creation of index-based contracts, the single most popular type of derivatives. The case in this chapter shows how the practices and the types of 'market behaviour' that developed in options markets gained the ability to influence the normative perception of the regulatory market participants and in so doing brought about a creation of a new definition that separated gambling from trading. Chapter 8 discusses the main concepts of the thesis' theoretical framework in the light of the empirical findings and offers directions for future research.

Chapter 2

Literature Review and Theoretical Framework

Introduction

The thesis aims to throw empirical light on the question of the development of financial markets. Harrison White's influential article about the formation process of production markets was titled: 'Where do markets come from?' (White 1981). This thesis is trying to provide initial empirical material that could help to develop an answer to the question: where do *financial* markets come from? The thesis analyses the processes through which contemporary financial markets come into being. This chapter presents several tools that will be used to analyse the development of options markets. Financial markets evolve through continuous interaction among a diversity of actors, who promote different, and frequently conflicting, cultural, organisational, and technological agendas. The underlying assumption of the theoretical framework that this chapter presents is that financial markets develop through a process in which connections among differential actors are realigned and reconfigured, thereby developing the market connections continually. Therefore, when trying to analyse the phenomenon of financial markets, a theoretical model is needed that describes the development of such a network.

According the Oxford dictionary, the word market has three different meanings: (1) the physical marketplace, (2) the gathering of people in such a place and (3), the legal right to hold a meeting in the marketplace (Pearsall 2001). The three meanings point to three intertwined aspects of markets.[5] First, markets are material environments in which the economic activity takes place; second, this activity is performed by actors; third, the activity is conducted through the

[5] Naturally, this threefold definition does not cover all the aspects of markets. For a comprehensive review of conceptual approaches to markets see (Lindblom 2002: 35-51)

application of agreed rules and practices. The fact that the same word represents the three aspects of markets hints at the sociological interest that markets create. Markets, as the first two dictionary definitions imply, constitute social institutions in which the material, non-human environment and the human actors maintain a constant contact. This connection between the 'market' as a material entity and the 'market' as a representation of the worldviews held by human actors raises the sociological question about the nature of the relations between the humans and the non-humans involved: do the humans activate and operate the environment or are they equally being framed and constructed as actors by the material and technological space in which they operate? Can we speak of interactions between the two? In addition, would it be useful, in the context of markets, to maintain an overarching distinction between humans and their material and technological environment? The second and third definitions refer to the relation between rules, or the structural aspect of the market, and the action in the markets. More generally, these definitions point to the fact that markets, like many other social institutions, maintain an ontological status that is based both on their structure and on the action that takes place within them. In other words, markets do not exist merely because there are organisational and material structures that sustain them, and not only because trading takes place in those structures, but also because both structure and action maintain a mutual constitutive relationship. Therefore, in order to be able to present a sociological discussion about markets from the above perspective, it is necessary to construct a theoretical framework that does not see the structure and the action in the market as two separate constructions, but as two aspects of the same social phenomenon.

Markets in general, and contemporary financial markets in particular, as this thesis will demonstrate, challenge the common sociological analysis by questioning the validity of the definitions that distinguish human actors from their material, technological environment and the definitions that specify exclusive boundaries for social structure and social action. As the empirical material in the thesis shows, contemporary financial markets came into being and operated while constantly crossing the definitional boundary lines between human actors and the material non-human actors and between structure and

actions. Accordingly, this chapter will offer several theoretical tools that are aimed at overcoming the problems that those prior divisions create for the conceptualisation and understanding of markets.

These two axes, the actor-environment one and the structure-action one, will serve as general guidelines for the review of sociological theories that analyse the development of markets and their operation. However, the sociological research and discussion about economic activity is also influenced by the dominant scientific discipline in the field – economics. The success of economics as a discipline in the last two centuries, and particularly the exponential rise of financial economics in the last three decades forced all other social scientists who study markets not only to refer to the social and organisational phenomena, but also to address the way economics depicted the same phenomena.[6] As in other fields in which there exist dominant professional and academic institutions (e.g. law, medicine, engineering, accounting), the sociological study of markets is influenced by the existence of economics as a dominant discipline. As a result, as the review of theory shows, sociological theory of the market does not only describe and analyse markets, but also examines critically the relations between economic theories and markets.

One of the fundamental premises of neoclassical economics is that markets develop as representations of the natural tendency embedded in people to maximize profits. In contrast, an intuitive sentiment about the possible lack of compatibility between this assumption and modern financial markets can be felt by anyone who ever observed a financial trading arena. Even if one accepts the assumption that a *homo economicus* does exist, the environments in which the trading of financial products takes place look too complex to be simply a direct representation of any single human tendency, regardless of how influential that tendency may be. The observer would quickly note that multiple means of communication are used (telephones, computer screens and forms of verbal and non-verbal face to face interactions), that many of the people on the trading floor

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[6] The relations between economics and the economy in general and financial markets in particular, will be discussed in more detail later in this chapter.

are not buyers or sellers, but are staff members who fulfill functions in the organizational structure of the market, and that the financial products traded are complex.

From the neoclassical point of view this complexity is explained using of a mechanistic metaphor – the market is a machine whose most important part is the transaction – the continuous settling of prices and volumes among the buyer and the seller. The rest of the actors involved – humans and machines – facilitate this process but are, in effect, external to it. In addition, this perspective would tend to 'flatten' the actors who operate in the market and present them as representations of particular element of the theory.[7] This chapter reviews theoretical approaches that offer an alternative analytical perspective. First, according to the proposed framework, the process through which financial markets evolve is not a representation of a single set of ideas that are brought into being through organizational and technological means. Instead, the approach presented here suggests that actors who promote a variety of agendas take part in the creation of financial markets, and markets are therefore not simple organizational incarnations of sets of ideas, but assemblages of many conceptual frameworks.

Such an aggregate of interrelated concepts could be described as a network of ties or of connections among the actors. Indeed, the network metaphor has become an influential image through which markets were described and analysed. The review in this chapter is dedicated mainly to discussions about the evolution of the various conceptualisations of market environments as networks in contemporary economic sociology. As the review shows, while there is ample research and theoretical discussion about the initial creation of social and organisational networks, less material refers to secondary formation of networks; that is, how networks are reconfigured and how new ties are established based on existing ones. Such phenomena are of particular importance in the case of financial derivatives markets because, as the material in the thesis indicates, the

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[7] An example for such a flattening process is the concept of 'noise traders', used commonly in financial economics (Gemmill 2002)

first markets for the organised trading of options evolved more because of reconfigurations of existing networks and less because of primary creation of such networks. In other words, the evolution of these markets was based on or the development of new meaning to existing connections or on the realignment of ties among the actors.

From a single market to 'multiple markets'

A search in the neoclassical economic literature for a detailed theoretical account about the development of markets may lead the observer to the conclusion that markets in mainstream economics could be compared to the big bang in physics – in both disciplines these concepts present a boundary to the conceptual and heuristic tools of the discipline (Swedberg 1997).[8] As in modern physics with regard to the creation of the universe, neoclassical economics, within its disciplinary boundaries, did not develop the tools to conceptualise and generalise the events that led to the creation markets. Granted, a large part of microeconomics is dedicated to the analysis of market behaviour once markets are in existence. Yet, there is scarcely any theoretical discussion in the economic literature about the formation of markets. For example, in their critical review of the literature of institutional economics Campbell and Lindberg noted that: "[t]his literature implies that markets occur naturally or spontaneously, in the sense that actors do not deliberately plan or construct them in advance of actual transactions[.]" (Campbell and Lindberg 1991) p. 348-9.

The analysis of the markets in mainstream financial economics, in particular the formalisation of abstract models for the description of markets, tends to follow the heuristics that have held sway with neoclassical economists since the beginning of the 20th century. In fact, the formalised abstract description of markets played a large part in the development of the 'marginal revolution' in economics, but at the same time drove the field away from acknowledging that

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[8] It has to be mentioned that other streams in economics did address the issues related to the formation of markets in detail (for example, Hodgson 1988; Hodgson 1993).

markets, being social institutions, are fundamentally historical and idiosyncratic institutions and not merely reproducible manifestations of theoretical assumptions (Swedberg 1994; Lie 1997). The de-institutionalisation approach that underpinned modern economics allowed the disciplinary assumptions the ability to be applied universally. Indeed, the success of modern economics both as an academic discipline and as a policy tool can be attributed fundamentally to the universalistic turn in the discipline (Whitley 1986a; Whitley 1986b). In spite of its undeniable contribution to the popularity of economics, the universal approach to markets – the underlying assumption that markets are a-historical and are being created through a uniform set of procedures – was challenged continuously both by economists and by other social scientists. Therefore, it would not be correct to portray the economic conceptualisation of markets as if it were completely homogenous.

Several social scientists have challenged economics' meta-theoretical approach, suggesting that the organisation of markets is dependent on the specific political and technological conditions that existed in society at the time. For example, Polanyi's influential concepts of the different types of economic organisation were in essence an attack on the more far-reaching assumptions of neo-classical economy (like the assumption that 'perfect competition' markets are the only type of markets in existence) (Polanyi 2001). This theoretical approach suggested that the relations between the society and the economy differed radically from the relations predicted by the neoclassical economists. In particular, Polanyi rejected the assumption that markets exist as an independent institution in society – a 'subsystem' according the Parsonian classification (Parsons and Smelser 1956). Instead, Polanyi claimed, the structure of markets, their political significance, and their technological apparatus, are all dependent upon the material and cultural conditions that existed in the society at that time. As this review shows, these ideas were used three decades after Polanyi as a platform for the creation of the 'new economic sociology'. Polanyi himself, however, was not trying to develop a society-dependent conceptual framework but instead placed his theory in an evolutionary framework and predicted that economies of simple

societies may eventually reach a state of 'perfect markets' (Polanyi 1971).[9]

This evolutionary link between society and the markets within it stands in contrast to empirical evidence that shows that even at the heart of the capitalistic economic mechanism, in financial markets, instead of finding a high degree of similarity between markets and society, there exists a large variety. For example, the economist Dennis Carlton showed that in different financial markets there exist different sets of conditions that need to be fulfilled so that the markets will clear the transactions (Carlton 1989). Carlton showed that, in contrast with the neoclassical assumption that markets clear through the equation of prices and volumes, clearing in most of the markets is achieved through a combination of prices and some other factor, such as the length of the buyer-seller relationship or knowledge about the buyer's and the seller's needs. She showed, that is, not only that there is a variety of market mechanisms under the same societal conditions, but also that basic market mechanism, such as clearing, did not follow closely the neoclassical prediction, but operated as if they were hybrids of general economic theory and specific social variables.

This trend expanded and in the last two decades a growing amount of research has appeared that showed that the neoclassical assumptions are problematic both in historical cases (e.g. England in the 18th century; Carruthers (Carruthers 1996)) or contemporary markets, such as the New York futures exchange and a US options exchange (Abolafia 1996) (Baker 1990). The criticism of the assumptions about the universality of the markets focused on two main areas. First, each market tends to display a different pattern of behaviour. Second, the specific historical conditions that existed when the markets developed played determining roles in the formation of the markets (Hirschman 1986). Abolafia's research on the New York Stock Exchange showed that the neoclassical view that portrayed the financial trading world as an egoistic, profit-driven social environment was far from accurate. Traders frequently created social networks were based on clear rules of reciprocity and very seldom operated alone. Traders

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[9] This type of historical determinism is, at least in part, based on the Marxist analysis of the markets.

who failed to follow those rules risked being excluded from the trade circles. Baker found that traders tended to operate within more or less a set network of trading associates (Baker 1990). In general, this newer analytical trend claimed that conditions surrounding the market activity were not, as the neoclassical theory suggested, variables that were simply fed into the constant ahistorical, mechanism of the market, but were instead dynamic parameters that played an integral part in that behaviour.

The general perception that markets are outcomes of specific historical circumstances and not representations of a single, overarching set of ideas was also the starting point in the development of a theoretical perspective on the differential actors who took part in the development of markets. If, as the analytical case studies show, markets develop as part of specific historical narratives, it should be assumed that not only the outcomes – the markets – would turn out to be different in each and every case, but also that various actors who take part in the formation process have different worldviews about 'the market' (White 1988). The participation of multiple groups that hold different worldviews of the market reduces the likelihood that the evolving market would be a material and organisational representation of single set of values and concepts. As the empirical material in this work shows, options markets were formed through a constant process of negotiation and struggle over the shape that the organisation would have. In a broader context, the formation of contemporary financial markets should be analysed as a process that is consists of multiple interactions among actors who hold and promote different worldviews. Consequently, the different perceptions of the markets are accompanied by the development and institutionalisation of differential organisational and technological patterns that support the desired goals of the worldview (Zafirovski and Levine 1997) p.278.

This assumption about the differential formulation of perceptions in the markets can also serve as a basis for a more detailed description about the behaviour of market participants and thus would help re-define the boundaries between market behaviour and market structure. The analysis of markets in functionalist sociology, and especially in influential theoretical works such as Parsons and

Smelser's *Economy and Society* (Parsons and Smelser 1956) included the implicit assumption that there an isomorphic relationship between activity in the markets and the meaning of this activity to the various participants. In other words, the fundamental assumption that underpins many of the sociological theories that followed Parsons and Smelser is that because market participants take part in the same activity, that activity has roughly similar meaning to all of these participants (Swedberg 1991). In contrast to that view, the empirical material in this work shows that the fact that market participants agreed on a basic set of rules and conceptions that governed the interactions in the markets did not prevent them from developing and *practising* different cognitive, ideological and organisational schemes through which they perceived the markets. This observation owes much to another trend of research within the new economic sociology – the perception of markets as cultures. Viviana Zelizer offered the model of 'multiple market' aimed at 'identifying types and patterns of social, structural and cultural variations' in the markets (Zelizer 1989: 630). Zelizer applied her model to empirical cases and analysed the development of different social perceptions about money (Zelizer 1997). Money, like markets, was presented in classical sociological theory as an important tool in the rationalisation of social life and as an objectifying device through which a multiplicity of relations between objects, agents and social structure are 'translated' to abstract quantities (Durkheim 1986; Simmel 1990; Weber 1968: 635-640). In contrast, Zelizer showed that through various processes of social construction, various 'types' of money developed. That is, in spite of the fact that the fundamental practice through which money is used, transaction, was accepted by all of the agents, the various actors gave different interpretations to this practice that varied widely from each other. This cultural aspect of the markets another important layer to the understanding of how different worldviews participated in the formulation of financial markets. As chapter 4 shows, worldviews did not merely serve as the initial sources of motivation for the various groups who took part in the development of options markets, but were one of the factors that defined the organisational and social identities of the groups or organisations.

Markets as networks

The two schools of thought described above – the description of markets as social institutions and the cultural description of markets – brought about a significant change in the sociological perception of economic activity in general and of markets in particular. Gradually more research material was published that described markets as contextual historical and social constructs. Similarly, by exposing the cultural elements that underlined economic activity sociologists such as Zelizer weakened the validity of the Parsonian claims about the uniqueness of the economic activity, thereby placing economic activity on par with other varieties of social action. The fact that economic activity lost its unique position in the sociological worldview helped to shift the research agenda from the attempts to explain the nature of this activity to theoretical and empirical efforts aimed at describing the conditions that facilitated it. An influential theoretical trend developed through the attempt to formulate a connection between existing societal structures and markets. The notion, presented by Polanyi, that markets are pre-empted by other social institutions was taken up by Mark Granovetter and was used in his influential article from 1985. Granovetter presented his approach as a possible answer the problems he identified in the two leading perspectives used to analyse markets: "A fruitful analysis of human action requires us to avoid the atomization implicit in the theoretical extremes of under- and over-socialized conceptions. Actors do not behave or decide as atoms outside a social context, nor do they adhere slavishly to a script written for them by the particular intersection of social categories that they happen to occupy." (p.487). According to Granovetter, the neoclassical assumption about the atomistic behaviour of actors who are motivated solely by profit- or utility- maximization is misleading. Similarly, the argument according to which market participants' behaviour could be attributed entirely to internalized norms and values is misleading and distorts the understanding of the markets. As an alternative, Granovetter suggested that economic transactions that take place in the markets are 'embedded' in social networks. Granovetter, for example, argues that economic behaviour is embedded in networks of personal

relations, which in turn are bound by cultural and social frameworks. Markets, according to this analysis, should be regarded as sets of social networks, which encompass the norms and values that are manifested in their infrastructures, the actions of the participants, and the interactions between the two spheres. Following this perspective, the effects of the networks underlying the economic activity in markets were studied by a growing school of sociologists (Fligstein and Bratley 1992; Uzzi 1996, 1997). By taking such a social process as the underlying heuristic through which markets develop, empirical research was able to gain a comprehensive analysis of markets without relying either on the neoclassical assumptions, or on attributing the evolution of a specific market structure and behaviour to external cultural, political or technological factors.

The hypothesis that markets are embedded in existing legal, social, cultural material structures does help to free the concept of markets from a reliance on an abstract set of assumptions about supply, demand and profit-maximisation, but it does little to explain the nature of the process through which markets evolve. For example, the theory does not provide a satisfactory answer to the question of the effect that the embedding of markets has on the social networks on top of which markets developed. This argument is pointed to by the fact that the network approach does not place enough emphasis on substantial power differentials among the actors that make up the market network. As a result, a decision by a relatively powerful actor will not only change the relations of the network node that the actor represents with the others connected directly to it, but will also have an effect on other ties in the network.

Burt's concept of 'structural holes' (Burt 1992) makes some progress towards the definition of power differentials in the network structure. The concept defines a structural hole as a location in a social network where there exist no ties among the actors. An actor who is positioned in a structural hole can act as an intermediary for other actors and therefore, such a position could be utilised by the actor to improve its power with regard to other actors attached to it.

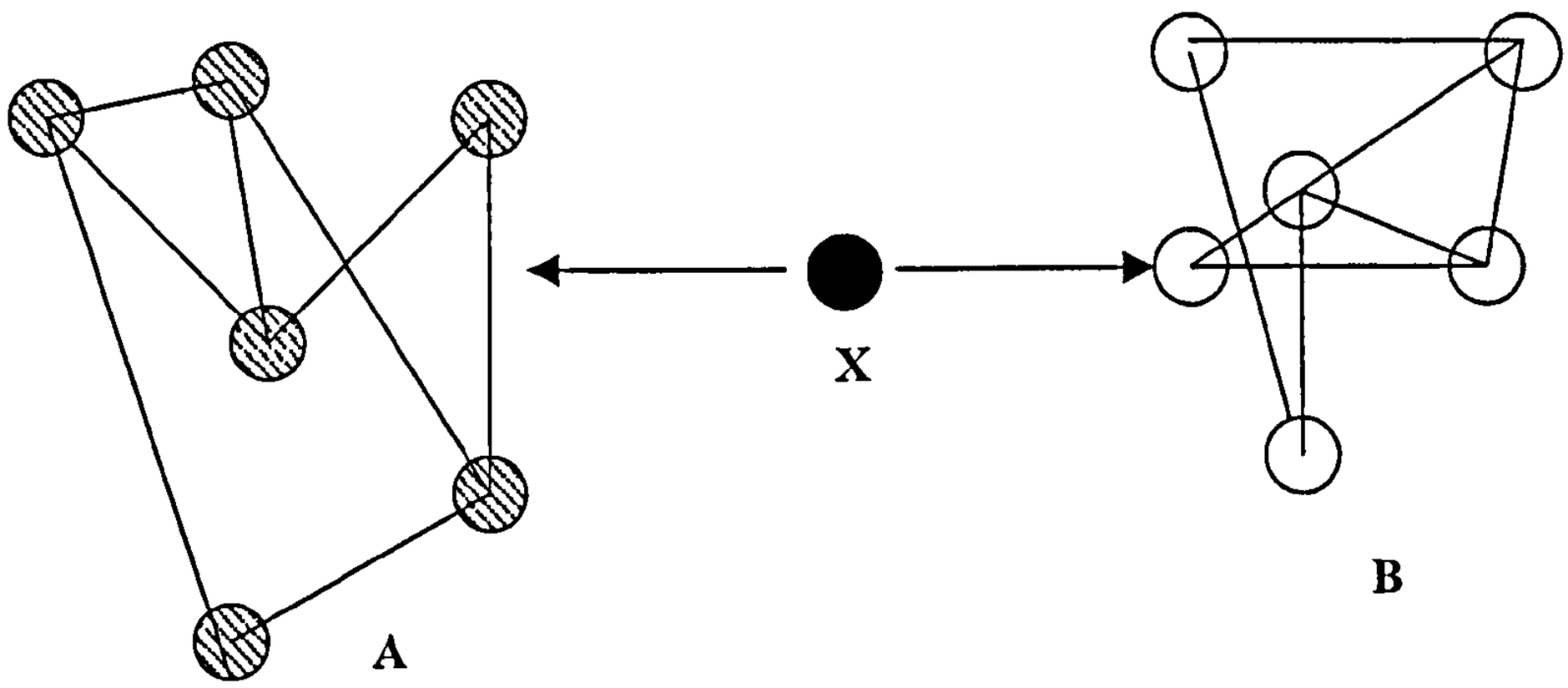

Figure 1: 'Structural hole'. There are no connections between the clusters of actors A and B. Therefore, X, who is situated in a structural hole, can serve as a monopolistic mediator between the two clusters.

However, the hypothesis about structural holes does not take into account that an actor can gain a powerful position not only if that actor has a monopolistic position role in the topology of the network. In effect, the powers of the actors can stem from their ability to affect the direction of other connections between nodes, or even to actually re-route such connections. The case in chapter 7 of this work, in which the SEC and the CFTC decided to create a conceptual boundary line between index-based options and futures, is an example for such 'remote' re-routing of connections. As a result of the mutual regulatory decision, the connections between the futures exchanges and the financial products they traded were replaced by alternative connections between options markets and similar financial products. Another aspect that needed further development in the initial conception of markets as embedded networks was the question of the dynamic nature of ties between the actors. Granovetter saw the ties as fundamentally established patterns for the transaction of resources among actors. As a result, in aggregate, the network was regarded as a net effect of the ties. Although this view is remote from the atomistic perception of the market, a part of that perception still echoes in it. In particular, by reducing markets to the net effect of the ties in them, it is implied that that different connections are homogenous, or have similar effects on the participants who take part in the performance of those connections.

Empirical research by Joel Podolny showed that market networks were not only

homogenous organisational settings that served as infrastructure for transactions, but also had far-reaching implications on the flow of information in the network. (Podolny 2001). Podolny demonstrated that the establishment of connections between powerful actors in one part of the network contributed to changes in other parts, as actors inferred from the existence of these ties that new allegiances were forming and positioned themselves accordingly. Network topologies, therefore, are important not only because of their usefulness to the connected nodes, but may be of equal importance to all of the other actors because of the informational value embedded in the particular topology. Therefore, market's networks should be seen not as a single layer of connections but maybe as two layers superimposed one on the top of the other. The primary network is the one composed of ties between the actors while the secondary one, corresponding to the first, is a network composed of the perceptions of each of the actors of the ties that the rest have among themselves and its perception of the network. In other words, the perceptual network is composed of the various views that the actors have about the market and their place in it.

This addition of the perceptual network to the network that is composed of ties can help in building a more detailed explanation about the effect of ideologies and worldviews on the development of markets. For example, White suggested, in his famous article about the creation of production markets, that the development of production markets is based on the reproduction of organisational behaviour patterns among actors (White 1981). White's description assumed that many of the actors hold similar worldviews and tend to translate them into actions in a similar manner. The historical narrative presented in this work shows that the development of options markets differed from this description significantly. It is true that assimilation played part in the formation of the market network as exchanges imitated the initial idea to trade options. However, assimilation was not the only effect in operation. For example, Chapter 5 of this thesis shows that the locations of actors in the perceptual network (i.e. how they see other actors and the connections in the network), as well as the identity of the cultural and the social structures in which the markets were embedded (for example, the Chicago commodities trading culture) were, in effect, the constituting forces behind the development of market mechanisms

such as competitive market makers.

The concept of perceptual networks can also shed new light on the issue of ideologies and worldviews as sources for motivation. For example, the notion of competition is used widely both by market participants and by students of the markets. Baker at al. (Baker, Faulkner and Fisher 1998), for example, regard markets as an 'intertemporal process' of economic exchange that is influenced by power, competition, and institutional forces. In this schematic context, competition is seen as a destabilising force, while the institutional forces tend to strengthen the ties between the actors (p.153-4). The stability of market networks, according to this scheme, is the 'net effect' of these forces on the network. In contrast, the data in the work shows that different actors gave different interpretations to notions like competition. As chapter 4 of this thesis analyses, the evolving options exchanges used the notion of competition to strengthen their ties with the financial regulator. Therefore, the notion of competition should not be seen as a single set of social and organisational motivations, but rather as the different types of devices that were utilised by the various actors. Consequently, the stability of market networks was dependent on the ability of the various actors to treat concepts like competition as resources that helped to maintain the relations through translation.

Actor-network theory and markets

This theoretical assumption that there exist multiple perceptions of 'the market' leads to the question about the process through which markets develop. Assuming that the agents that take part in the development of markets do not share worldviews about the markets, it can be asked what enables cooperation between them, or how do markets come into being when the groups that make them up have possibly competing ideas about what they are doing.

Following the assumption about the co-existence of perceptual market networks and networks of market ties, can it also be assumed that there exists a process of

co-evolution of the networks – that markets evolve through interaction between the perceived ties and the institutionalised ways in which information is routed among actors? Uzzi showed that in the garment industry the market network maintains a mixture of ties that are embedded in existing social structures and 'arm's-length' ties – ties that are based on the transaction of goods or information and are not supported by other social relations between the actors (Uzzi 1997). The research also showed that the different types of ties were used typically for different types of informational exchange. Thus, Uzzi found that the embedded ties were used typically for the transfer of detailed, fine grained or proprietary information, while the arm's length ties served more as mutual command and control routes where transaction-related information was passed. If this mode of explanation is followed and examined from a historical perspective then it can be assumed that the evolution of a market is a process of transformation of the different ties. For example, connections change from being embedded ones to arm's-length ones, as the social structures into which they were embedded weakened or gradually became less relevant to the nature of activity that took place in the market. Likewise, it can be assumed that transaction-based, arm's length connections would turn into embedded ones when the actors connected become related or associated in other ways. Moreover, as existing ties are transformed and the nature of information they transfer is changed, it would be reasonable to assume, as Podolny showed, that the meaning that those ties have to other actors in the network would also change.

This analysis implies that the study of the evolution of markets should focus not only on the creation of ties and connection between actors, but also pay more attention to the processes through which existing connections, or even whole topologies of connections, transform from one type of social and organisational structures and practices to another. Therefore, in order to understand the evolution of financial markets, which are undeniably environments with a high density of networks, it is necessary to conceptualise an answer to the question of how such processes of transformation happen. A possible direction could be to expand the conceptual perspective of economic sociology by combining it with tools offered by an influential theoretical perspective in the sociology of science

and technology – actor-network theory.[10] In an exemplary actor-network case study Akrich (1992) described the social and organisational transformations that a mechanical method for the use of wood waste undergoes as the machine that turns wood waste into fuel (by compacting the wood material to combustible bricks) is transported from Sweden to Nicaragua. Akrich shows that as the machine was transformed from a compactor for wood waste to one that compacts cotton waste, the connections among the various users of the machine, and the potential customers for the fuel it produces were transformed. For example, the compacting process demanded that the cotton waste would to be collected, which in turn called for more manual labour. As a result, the introduction of the new mechanised process reconfigured the relations between the labour force and the owners of the cotton farms, the haciendas. Before the introduction of the compacting machine the manual labour was part of a relatively simple transaction-based connection, while after the new machine was brought to Nicaragua the collection of cotton waste became connected to other significant procedures: the selling of the combustible bricks, avoiding the spread of pests and more. The new meanings that were added to the connection between the farm owners and the labourers created, in effect, a perceptual network that underlined and facilitated the operation of the relations among the actors. Moreover, the development of this network accompanied the addition of new actors to the network (for example, potential customers for the compacted fuel bricks and the governments of Sweden and Nicaragua). Thus, the development of the perceptual network was not only an outcome of an innovation process – the introduction of the new machine – but in fact constituted a significant part of that process. The altered meanings that the ties acquired were the basis for new economic activity, for the construction of buyers and sellers, and in fact laid the foundations for the construction of a new market.

Akrich's research demonstrates a central notion in the actor-network theory – the notion of translation. Translation can be regarded as an attempt by actors or actors who are part of an existing network to impose meanings or practices on other actors in the network. Thus, translation can be seen as an attempt to re-

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[10] For reviews of the basic principles of the approach see (Callon 1995, especially pp. 50-63)

frame the actors' perceptual network. Such an attempt, if successful, may result in a change to the topology of the network whereby some actors – the initiators of the translation attempt – would gain a more central position than they had initially, and possibly having more ties connected to them. Therefore, translation attempts can serve as an explanatory tool not only for changes in the topology of networks but also for the changes in the nature of the connections. As mentioned above, the development of market can be explained by a transformation in the ecology of connections in the market. For example, as the historical narrative in chapter 4 shows, the development of the organized options markets was characterized by a shift in the balance between embedded connections, based on Chicago's futures trading community, and arm's length connections between the big securities firms and the Chicago traders. This shift in the network profile of the market can be attributed to an aggressive campaign aimed at persuading the market participant to support the new financial product, stock options, which was presented by a group of innovating traders. As the chapter shows, the result of this translation process was that decades-old, embedded connections were replaced by new, formal connections, ultimately leading to the rerouting of connections toward new central point actors.

Convergences of connections in the market network toward central points are related to the notion of power in the conceptual description of evolution of markets. The notion of translation is related to power in two interrelated ways. First, following Podolny's notion about the symbolic significance of ties, a successful attempt to create a translation in a market network would be seen as an indication of power differences between the initiators of the translation and the ones on which it is applied (Podolny 2001). In addition, such a process may add to the concentration of the network around fewer central points than it had been previously, which in turn may amplify the effect of communicative aspect of the convergence, leading to the creation of a positive feedback process in the formation of power. Burt refers to the development of a similar process in a social network as the 'echo effect' of the network (Burt 2001).

The second aspect is the effect that the centralization of the network has on the power of the actors, and on the shape of the market. When looking at the actor-

network's perspective from a topological perspective, an extreme case of a translation attempt is when an actor, or a group of actors attempts to position itself as an 'obligatory point of passage' (Callon 1986). Such an attempt would be an effort to try to manipulate the perceptual network in such a way so that all of the actors would need to change their practices and thus would cause a change in the topological structure of the primary network. This notion corresponds with Burt's notion of 'structural holes' that was mentioned earlier. According to both notions the connectedness of a node in the network is an indication of the power level that the actors have. The main difference between the two conceptual representations lies in the nature of the theoretical perspectives they apply in terms of the stereotypical distinction between structure and action. While for Burt the network is an analytical description of a structure, the actor-network approach is predominantly a theory of action. Therefore, from this perspective, the network is not composed only from the connections between the actors, but instead it is assumed that there exists an irreducible continuum between the actors and the network they embody. Power in such a configuration would be described not as a position in a given topology of the network, but more as a continuous string of translation attempts that are aimed at maintaining a certain actor, or group of actors in a central network position (Latour 1986).

These two related aspects of power-formation are relevant to another important concept of the actor-network theory via which the theory could contribute to an understanding of the development of financial markets. This area is the unique conceptual framework used by the theory to describe the interface between human actors and their material and technological environment. Akrich's research, as can be seen from its description above, does not focus mainly on the social relations that developed around the compacting machine, but rather considered the machine as another actor that took part in the formation of the network. This aspect of actor-network theory, according to which there exist non-human actors as well as human ones, differs radically from the rest of the theoretical approaches presented here that also use networks as their main analytical metaphor.[11] In contrast, as the history of options markets shows, the

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[11] For a detailed discussion about the use of the term see (Callon 1992).

material and technological environment in which market activities took place played a crucial role in the shaping of the markets.

In order to show the importance of materiality to the analysis of markets, it would be useful to return to the example given at the beginning of this chapter about the observer watching a trading floor. This time, however, the emphasis would be put on the material nature of the market. The observer would immediately notice that the actors are surrounded by technological artefact that they use constantly: telephones, handheld computer terminals, screens that display prices in other markets or other trading arenas of the same exchange, as well as news and other information. Following John Law's inquiry about the nature of agency in the technological society (Law 1991), one may ask if market participants would still be actors in the market network if they didn't have access to the technological artefacts they use on the trading floor.[12] The material presented in this thesis supports a negative answer to this question – market participants are heavily dependent on the use of technological artefacts for their performance. As shown in the different chapters of this work, the development of options markets was based on a several technological devices through which market-related activity was conducted: sheets with arrays of predicted prices, computer terminals, calculators, and others.

From the perspective of the "social" network approach described earlier, however, the fact that technological artefacts are used in financial markets would not change the nature of those social environments fundamentally. Networks, according to this theoretical approach, are seen either because of the impact on the market activity of pre-existing social structures (following the 'embeddedness' approach of Granovetter) or as the cumulative effect of ties between the market participants (like in the approach presented by Uzzi).[13] In both cases, the material and the technological attributes of the markets – the

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[12] This question is also related to the discussion about the location of agency along the actor-network continuum. For several relevant references see (Callon and Law 1995; Haraway 1991; Latour 1987, 1988).

[13] There are several empirical studies that combine the two concepts of networks (see (Rauch and Hamilton 2001) for a review).

technological infrastructure that supports market activity – are disregarded or perceived as an external factor to the core activities that take place in the markets (for example, construction of trust among actors, decision making about transaction). In contrast to this approach, this work suggests that the material and technological infrastructure through which the development of contemporary financial markets takes place, and in which these markets operate, is of critical importance for the understanding of the markets. In particular, the history of options markets shows that market activities were linked tightly to practices performed using technological artefacts and in several cases actually revolved around the capabilities of the technology.

Moreover, several of the areas that researchers from the "social" network perspective define as core market activities, and on which many of the research efforts are focused are exactly the same areas in which, in financial markets, human agents and technological devices – non-human actors – maintain close and continuous interactions. For example, in the last five years there has been a growing trend in using the "social" network approach, as presented before, to discuss the factors responsible for the development and maintenance of trust in economic environments (Brass, Butterfield and Skaggs 1998; Buskens 1998; Buskens and Weesie 2000; DiMaggio and Louch 1998; Gulati and Westphal 1999). The different elements in the theoretical explanations through which the trust issue is discussed are varied and a detailed discussion in them is beyond the scope of this work. Furthermore, the researchers use sophisticated methodological tools and elaborate hypotheses in their analyses. Similarly, the phenomena studied represent the height of contemporary capitalism (for example, Gulati and Westphal analyse the influence of networks on board interlocks when inter-corporation joint ventures are discussed). Yet, phenomena such as the development of trust and cooperation and their effect on the nature of economic networks are analysed as if the technological artefacts served only as props in them – emphasising or helping the main activity but not taking actual part in it.

The exact nature of the differences between the views about materiality in the "social" network and the actor-network approaches can be revealed further when

aspects of materially are examined in a societal context. Shirley Strum and Bruno Latour conducted an analysis of baboon societies (Strum and Latour 1999) in which they suggested that the main difference between baboon and human social organisations lies in the fact that baboon society, unlike human society, does not have material artifacts. Therefore, baboons, unlike humans, lack the ability to create material institutionalizations, material representations, and exemplifications of the social order. The criticism of the network theoretical approach presented here does not blame it for analyzing markets as if they were in a baboon society. After all, the presence of material artefacts is obvious in the picture of society that the approach portrays. There is however an important difference that places the analysis of markets according to the network approach somewhere between baboon society and human society. Material artifacts are used by actors (for example, cars are traded, segments of companies are transformed and then sold) but the artifacts are not part of the network itself. That is, the ties among the actors are 'naked' and the perspective does not regard the effects that technological artifacts have on the interactions among the actors and the evolution of the network as a whole. In contrast, chapter 6 in this work shows that the development of connections between trading counterparties in options markets was dependent on the representation of market risks in computer programs. Furthermore, the institutionalised representation of the market in computerised simulations or as part of algorithms for the design of portfolios created an organisational constellation, in which the connections among the actors and indeed the existence of the network itself were dependent on its non-human actors as well as on its human actors.[14]

It has to be stated that the dependence of markets on the non-human agents in them is not unique to contemporary financial markets. For example, the functioning of the Chicago agricultural commodities markets was based on the use of mechanised procedures for the sorting of wheat according to the size of the grains. This process put into effect the standardisation of wheat, a concept

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[14] In their ethnography of a trading room, Beunza and Stark present a similar case of a techno-social environment (Beunza and Stark 2002). However, the analysis presented here is different in that offers a historical look at the development of the environment and does not focus on its operation at a given time.

that enabled the trading of standardised futures contracts (Cronon 1991). In the same vein, it is shown in chapter 6 of this work that the ability of the options clearinghouse to perform its daily calculations was dependent on the transfer from a method that required manual intervention to a computerised one. It can be argued that the development of such machine-based procedures, and in effect, the exclusion of human actors from them was critical for the development of the market. This argument can also be extended from markets to other techno-social environment. Namely, the exclusion of the human actors from particular aspects of the operation of the environment is needed because the existence of the environments is dependent on the efficiency of the non-human actors.

The conceptualisation of financial markets according to the actor-network theory offers another answer to the question of commodification: the dichotomy between markets and products. Following the theoretical approach presented in this chapter, it can be assumed that the reconfiguration of nodes in existing markets' networks in effect defines not only the new market but, to a similar extent, the products traded in this market. For example, when a person buys a washing machine, she does not only buy the technological artefact but also, among other things, the guaranteed repair service that the manufacturer offers, and the assurance that water and electricity connections would be compatible to ones she has at home. In other words, the buyer buys the right to use the techno-social network of which the washing machine is part. Similarly, a stock option entitles its buyer not only the option to buy or sell the stock, but also, among other things, gives them the right to have the transactions cleared in the options clearinghouse and to have their options' position protection protected by the regulator's rules. Therefore, what is being produced and traded in the options markets are not only the options contracts but also, and equally the network of the markets.[15]

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[15] Another potential implication of this conceptualisation is that the use value of the products would be dependent not on the strength of ties within the network that constitutes the products. This assumption could add structural and historical dimensions to the pricing heuristic that is currently dominant and is based on dynamic and relational changes in supply and demand. Namely, a hypothesis can be examined according to which supply and demand are representations of changes in the relations among the actors that make up the market.

Stated differently, it can be said that the characteristics of the products do not represent inherent attributes of the product but rather the relations among the actors that take part in the maintaining, or performing those attributes (for example, a receptive and efficient repair service will contribute to the overall use value of the washing machine). Accordingly, the reconfiguration or a realignment of connections between actors in the network may result in the creation of a new type of product (Callon 2001). Chapter 7 describes such a case where two financial regulators reconfigured their mutual areas of responsibilty – a critical connection between these two actors, and in doing so imposed a new definition of gambling and in effect constructed new financial products, index-based contracts.

The last area to which the theoretical framework can potentially contribute is the relation between economics and the economy. As mentioned earlier in the chapter, the assumption about that economics is an external descriptive language of the economy was challenged by economists and other social scientists since the end of the 19th century.[16] More recently, this pillar of neoclassical economics was criticised also using the concepts of actor-network theory. This critical view suggests that economics does not merely describe an external "economy," but in many respects brings that economy into being. That is, the science of economics designs and activates, or 'performs' the markets (Callon 1998) p. 30. This general argument can be broken down into two interrelated ways in which economics affects the economy: how economics affects the actors and how economics affects the markets. As the theoretical discussion so far demonstrated, it is not assumed that the market and the actors are separated but instead that they are parts of the same techno-social network. However, dividing the question into two is a useful device that will help to explore more connections between the actors, markets, and economics.

The first assumption about relation between economics and the economy suggests that economic theories play a large part in the construction of markets.

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[16] For excellent reviews see (Lie 1997) p. 349-350; (Swedberg 1991) (Nelson 1994; Smelser and Swedberg 1994; Swedberg 2003)

That is, not only that these markets were not external to economics but also that economics was the blueprint used for the creation of the organisational and physical structures of those institutions (Garcia 1986; Guala 2001). The two examples mentioned (the Federal Communications Committee's auctions and the market for strawberries, respectively) construct a strong case against the assumption of economics being external to the economy. Indeed, the cases analysed in the papers show that, at least in some markets, economics was not used merely as a descriptive and analytical set of heuristics, but as a branch of engineering. Following the conceptualisation it could be suggested that markets in general and contemporary financial markets in particular, do not evolve as economics predicts, but instead are constructed according to principles coming from this scientific discipline. MacKenzie and Millo (MacKenzie and Millo 2003) discuss this aspect of the effect of the economy, suggesting that theories of financial economics did not merely describe the behaviour of options market but in fact performed them.

The second argument that can be suggested as a derivation from Callon's concept about the 'performativity' of economics is that the behaviour of actors is influenced directly by economics: namely, that actors behave according to the predictions of theories because they believe in their validity. From a first glance, it may seem that such a connection between economics and the markets would be harder to prove in the case of actors than in the case of markets. For example, as the material in this works shows (chapters 4, 5) it would not seem reasonable to assume that all options traders had economics degrees and that they indeed implemented that academic knowledge while trading.[17] However, the conceptualisation of markets as techno-social networks helps to see that actors *did* perform the theories of financial economics. As discussed earlier in this section, financial markets are techno-social networks in which the structure of the markets and the market participants are part of an irreducible nexus. This theoretical concept is supported by empirical evidence. Chapter 6 shows that by

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[17] Muniesa describes a similar situation in the Paris Bourse. The traders in that market did not believe the economic theory that underlined the operation of the trading algorithm the exchange used. However, the non-human actors in the market, the computerised trading agent performed the theory (Muniesa 2000) p. 304.

the early 80s a large part of the design of trading strategies in options markets was performed using a theoretical economics' model. Therefore, by answering the second question about the performativity: how economics affects the actors, a more detailed answer is provided to the first question about the connection between economics and the markets. Following the theoretical approach of this chapter, the answer to this question would be that the economic theories were performed directly less by the human actors and more by the non-human ones.

The approach presented in this chapter can contribute to the theoretical tools used in the study of financial regulation. In particular, the analysis here can offer an alternative to the 'action-reaction' perspective that dominated the field. In trying to characterise the constitutive powers that financial regulators have, Merton Miller (1986) suggested that many of the sophisticated financial derivative products existing today were developed as a result of financial entrepreneurs trying to break away from regulation.[18] New and innovative financial products, according to Miller, did not initially fall under the existing regulatory definitions and so allowed their users to be free from such regulatory constrains as reporting, compliance with strict risk-avoiding practices, and fees. The 'action-reaction' hypothesis makes an implicit assumption about the nature of the communicative process that takes place among market participants; the assumption that there exists a fluent and straightforward communication among them through which the sides gain sufficient understanding about the others' intentions and moves and react accordingly. Indeed, Miller describes a process that is very much like a metaphorical game of Chess. A financial entrepreneur makes a move (presents a new product or practice) and then the regulator makes a move (adapts the regulatory definition so that the new practice would be included); the entrepreneur then makes another move to which the regulator responses and so on.

The findings in this thesis show that such a description is not accurate, and that

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[18] Many of the examples Miller uses are taken from Over the Counter (OTC) derivatives markets, markets that followed a different historical path from the ones described in this paper. However, since Miller's argument is paraphrased in general terms it represents the 'regulators chase markets' approach.

the regulators and the exchanges did not react promptly to each other's moves and that the communicative process among the actors was not as nearly as straightforward. The agents held varied worldviews and thus gave considerably different interpretations to the proposed contracts; interpretations that were incompatible with each other. Further more, the fact that each of the regulators as well as the markets held different interpretations about the contracts had significant influence over the shape that index-based contracts eventually took. The case shows that the shape of the financial products that were approved was influenced much more by the *different* interpretations and worldviews, which the actors held, than by the ideas that were commonly accepted.

The network approach on which the analysis in this work is based perceives financial regulators as market participants.[19] This approach sees the dichotomy that classifies exchanges as 'initiators' and regulators as 'reactors' as arbitrary and unnecessary.[20] Moreover, by including regulators into the field of financial markets this approach highlights the complexity of the financial regulatory process. For example, Hutter (2001) points out that corporations maintain and promote a variety of agendas and that those are rarely compatible with one another. Leyshon and Thrift (1996) add that the discursive plurality, which exists in the interfaces between regulators and corporations, brings about frequent changes in the content and boundaries of the economic system. According to this approach it is expected that both regulators and corporations (in the context of this thesis – the derivatives' exchanges) would be playing dynamic parts in oligopoly-like systems where rules and practices are created, rather than operating in the previously assumed, more stable, binary 'zero-sum games' between one regulator and one corporation.

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[19] Among the pioneering work in the development of this concept are Abolafia & Biggart 1991; Granovetter 1985; Zelizer, 1989.
[20] This approach is related to the 'market reconstruction' school (Block 1994) and the 'regulation studies' approach (Bryant, Hooper and Mann 1993) (Rhodes 1997) .

Chapter 3

Methodology

Introduction

This chapter discusses the research methods used in the thesis. In general, two underlying themes can be identified that had a fundamental impact on the design of the research and on its implementation. The two were the variety of actors that were involved in the evolution of the market network and the distinctive features of information in contemporary financial markets. This chapter uses these themes as the underlying factors in the discussion of the methods used in the research and the issues raised during the conduct of the study.

The starting point of the research project was to study the development of financial markets. As mentioned in the introduction, trading of financial derivatives constitutes a large part of today's economic activity and the variety of derivatives products is immense. Hence, a decision was to be made on which section or aspect of the derivatives world the research would focus. After a preliminary examination of different types of derivatives products and trading environments, it was opted to concentrate on the development of organised, members' exchanges that trade derivatives. The main reason for this decision was that it was hoped that access to information would be easier in exchanges than in proprietary trading environments, such as investment banks or hedge funds, which tend to be more secluded.

An initial survey of the history of the financial markets showed that Chicago was the one of the primary locations where organised trading in financial derivatives developed. The two main Chicago agricultural exchanges, the Chicago Board of Trade (CBOT), and the Chicago Mercantile Exchange (CME), both of them long-standing exchanges (the CBOT was established in 1847 and the CME in 1919), developed, separately, markets that traded financial derivatives. The

CBOT, as will described in chapter 4, initiated the development of CBOE, the options exchange that began trading in 1973, and the CME launched in 1972 the International Monetary Market (IMM), the world's first exchange that traded futures based on currencies.[21] After background material was collected about the markets, the four institutions were contacted: the two originating markets CBOT and the CME, and the two derivatives markets, CBOE and IMM.[22] Although all of the institutions that approached were receptive, and supplied assistance, the most promising contact was formed with CBOE.[23]

As discussed in detail in chapter 2, the theoretical framework used in this thesis to analyse markets and their development regards them as networks of connections among a variety of actors. The motivation to use such a framework developed as the gradual collection of data indicated that in the creation of the exchange there was an extensive involvement of organisations other than its founding team. Therefore, although the development of CBOE was the initial focal point of the research, the collection of data was not dedicated exclusively to this institution. Therefore, after the initial data was collected, the investigative effort behind the study was to map the connections that evolved among the various actors and thereby to attain a description of the market's network.

Framing the field of the study as a network led to a series of operational decisions. First, it was necessary to delimit the extents of the network. Since the study refers to a chain of historical events, the chronological boundaries of the investigation had to be established. The starting point of the timeline was set was to be the time when the planning of the market began, in the late 60s. The cut off point in time was assigned to the early 90s, as it was anticipated that access to contemporary data about financial markets would not be feasible, because of reasons of confidentiality. The experiences during the data collection phase of the research indicated that the considerations about confidentially were appropriate, as this chapter discusses.

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[21] See definition in the glossary.
[22] In 1999, when the contacts were made, the IMM was owned by the CME.
[23] The initial contact with CBOE was made by the supervisor of this PhD project, Prof. Donald MacKenzie.

Second, it was necessary to define the topological limits of the network that the investigation would survey. Hypothetically, a market's network, and especially markets for financial derivatives could span entire societies, or even, as some scholars suggest (Sassen 2002), have global proportions. A detailed study of a global market network would have been beyond the scope of this work. Therefore, the decision about which areas of the market network were to receive a detailed investigative attention was based on the potential to discover original findings.

The initial study of derivatives markets showed that two sets of innovations, which originated from these markets, grew to be important features of the financial world in general and thus promised to be of particular interests: these were the development of quantitative financial risk assessment practices and the creation of index-based contracts.

Studying the history of CBOE as the development of a market network has implications for the conceptual identification of the methodology that the study used.

On one hand, since the study focused mainly on the history of a single market, it could be seen as a case study. Mitchell (1983) counts among the advantages of research that uses case studies the capability to obtain rich data with a high degree of validity, whilst situating and interpreting data within a wider context, thus achieving a holistic view on the subject. The next section specifies the methods used in the thesis to construct such a holistic picture of the development of options markets.

The use of case studies is also criticised for being a restrictive methodology that limits that capacity of the research to look beyond the boundaries of the case to gather data and provide plausible explanations for the complex social relations that were observed (Yin 1994). One way to answer this criticism is to demonstrate that the findings collected from the case study are corroborated by the attributes of the wider field within which the case is located (Stake 1995). Putting a case study in wider context could be a way to increase the validity of the findings, but in turn, it may create another problem. If the validity of a research is dependent to a large degree on its similarity to findings from wider research projects, then the burden of demonstrating the reliability and validity is

placed on the explanations that connect the case study to the wider context. In other words, the challenge of proving validity is not met but merely transferred to another part of the analysis.

The way in which the methodology of case studies was used in this thesis offers a different approach to this challenge. The epistemological foundations of the 'market network' framework imply that describing the development of a market as a single, unified 'case' would prevent the research from unveiling the true nature of the process that took place. In other words, the framework suggests that the study of how markets develop could not be a case study but rather a string of interconnected cases that together constitute the historical narrative of the market. For example, chapter 4 describes the growing importance of the SEC as a financial regulator, and the development within the SEC of the regulative value of promoting competition. Related to this development was developing attempt of the founders of CBOE to achieve an approval to trade options in an exchange. Each of these two historical developments could be described as a separate case study, and it would be hard to gain a full understanding of the processes that took place without paying close analytical attention to the interactions between the two arenas where the events took place.

Description of the methods used

Following a survey of background material, the research consisted of two field trips to the US, one to Chicago and one to Washington, DC, each of which lasted 8 weeks. In total 34 semi-structured interviews were conducted, each ranging between one and four hours. All interviews were tape-recorded and transcribed in full. Guarantees for the confidentiality of the material collected were given to the interviewees and quotations that are used were sent to interviewees for review. For this reason, until clearance has been given, all of the interviewees in the thesis will be kept anonymous. During the field trips extensive archival work was done. Material was collected from the library and the reading room of the SEC, the archive and reading room of the Federal Reserve Board and through special

requests for documents from the SEC and the CFTC.[24]

The study of different groups in the market meant that both oral evidence, in the form of interviews, and evidence from written documents were collected. The use of two different methods for the collection of data was tightly related to the network approach that research adopted. As this discussion in this section suggests, the use of a multi-method approach is an essential factor in the realisation of a study of the development of financial market network, because important parts of the data are available only in one form and not in others. The different actors that took part in the evolution of the market network not only held different worldviews but also tended to operate and communicate in a variety of methods. These differences, when seen from the perspective of a research project were translated to a range of different historical materials.

A large part of the information in the study was collected from interviews with key figures who took part in the evolution of options markets.[25]The ability of interviews to unearth information that did not exist in any other form was manifested when the study focused on the social groups from which options markets originated. For instance, the culture of the commodities traders that played an important role in the creation of options markets, as chapter 4 shows, is largely an oral culture. The professional and normative socialisation of commodities traders was performed typically through an apprenticeship relation between a new trader and a more experienced. The lack of formal training meant that there was little printed material that explained in detail the different trading techniques and how to perform them. There was another important reason that knowledge in the culture of commodities trading was passed on orally and that was the need in confidentiality. The knowledge related to the performance of trading was guarded closely by the trading firms, because in the highly competitive environment of financial markets an ingenious use of techniques was one of the main ways to achieve an advantage over one's competitors. A similar

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[24] These request for documents used the American Freedom of Information Act (FOIA), which requires American agencies to make available documents that are not defined as secret or sensitive.

[25] This chapter refers later to the question of how the interviewees were chosen.

situation, as the empirical material shows, existed in options markets. Although the organisational and cultural infrastructure that developed in CBOE was different from that of the commodities markets, still most of the material that was attained from options traders was in the form of oral interviews.

On the other hand, other than traders and trading firms, virtually all of the other actors who took part in the formation of the market network were part of bureaucratic organisations and as such, their involvement in the creation of the market network was documented in detail. In general, these actors were associated with one of two categories: exchange-related organisational infrastructure (staff of the exchange, staff of the clearinghouse) and members of the financial regulators. As it will be shown below, in spite of the fact that unlike the traders, the exchanges, the clearinghouse, and the financial regulators documented their actions much of the information about the development of the market network was not readily available in the form of documents. CBOE, even before trading in it began, as explained in chapters 4 and 5, faced tough competition from other exchanges. Therefore, similar to the situation of the trading firms within it, CBOE – the staff and the members alike – could make very few of the documents available and the study had limited access to them. However, some documents were available and those helped to describe the formation of the market network. For example, the exchange's rulebook: CBOE, being an organisation owned by its members, developed a rulebook containing rules that governed the relations among the trading firms and between them and the exchange. As the market network developed and the more actors became part of it (for example, applications based on the Black-Scholes model), the rules were updated to incorporate those changes. Thus, CBOE's rulebook served as a complementary source for the material that originated from interviews with traders. By comparing material from both sources, it was possible to construct a historical narrative that showed not only how traders developed new trading techniques, but also how those techniques turned into part of the organisational infrastructure of the market.

All three financial regulators that are discussed in the thesis – the SEC, the Federal Reserve Board and the Commodity Futures Trading Commission

(CFTC), were allowed to create new rules as long as those were within the realms of their regulatory authorities. This process of rule making followed a strict set of procedures, each resulting in the production of documents that were put in the public domain (CFR, add ref). The first disclosure of an intention to change an existing rule or add a new one was done in the form of a publication of a 'concept release' – a document that described in broad terms what is the area to which the intended rule would refer, and called for comments from the public about the issues raised in the document. The next step in the creation of a rule was typically the publication of a 'proposed rule'. This document usually referred to the comments that regulator received from the public, discussed them, offered a structured proposal of a rule and again called for comments from the public. In some cases there appeared a few versions of proposed rules, each amending issues that were raised in the pervious one. Finally, a final version of the rule would be published and added to the American Code of Federal Regulations.

It can be understood from the description that such a public procedure of rule making supplied the study with invaluable material about the development of the options market. As the thesis shows, the markets for stock options were put under a strict regulatory regime, and as a result, many of the developments in them were conditional on changing existing rules or adding new rules by the regulator. The existence of the different releases allowed the study to develop a detailed chronological and thematic timeline that was used to analyse the developments of the network of the market. Another useful characteristic of the multi-stage structure of rule making is that it allowed the study to research market developments that 'failed', or did not receive a regulatory approval and to compare these with the ones that did become part of the formal regulatory structure of the market. By following this method, the research was able to gain a comprehensive account of the evolutionary nature of the market network. For example, the events described in the second part of chapter 5, which describe one of the early attempts to incorporate the Black-Scholes model into the market's infrastructure, follow a concept release that was not finally approved as a rule.

Several features of regulatory documents in general and releases in particular had

an impact on the design and application of research methods in the thesis. First, the releases exposed only a certain part of the process through which the market developed. The publication of a concept release comes only after the subject disclosed in them had already been discussed by the staff of the regulator. Furthermore, in many cases the initial idea to change an existing rule originates from the exchanges or other market participants. Thus, concept releases represent a mid-process stage in the formation of the market network and not an initial one. Second, although the financial regulators were demanded by law to make them public in various stages of law making, the publications, the releases, were not used only for this purpose. The analysis of the material showed that in several cases publications, concepts releases in particular, were not merely devices for the disclosure of information, but were also used as regulative tools in their own right, meant to encourage or dampen trends in the markets. Therefore, the information collected from the regulators' releases was seen not as a description of a given reality in the market but rather as a plan, motivated by normative ambitions, to bring about changes in a given reality. Third, the public releases were part of a dialogue between the regulator and the public. However, while the releases were in the public domain, the persons or organisations who made comments could ask the regulator to treat the comments as confidential and not release them to the public. Although some of the comments in the documents used by the study were public and were accessible, in most of the cases the actors who were closely related to the matter at hand asked that their comments would be kept confidential. It has to be noted that that although the content of the comments was not available, the identities of the actors who submitted the comments was known. The result of this factor from the perspective of the study was although the most relevant comments were not accessible the information in the releases provided hints about the opinions that the actors expressed in them and thus supplied starting points from which to develop inquiries in the interviews.

The dispersed nature of the empirical data in the field, which led to the need to use two research methods (interviewing and document analysis) in order to gain an elaborated picture of the historical events, also meant that the investigative mode of the study was exploratory. The narratives that eventually composed the

greater historical picture were collected through following leads from documents to people and vice versa. Typically, the investigation would start by tracking people according to names that appeared in documents; these would be interviewed and shed more light on the matter, which showed the relevance of additional documents, which, in turn, mentioned more names. One of the results of using this mode of investigation was that the description of the historical events produced by it tends to be detailed and multi-layered. Other aspects of this mode of inquiry are discussed in the next section.

Issues that arose during the study

The issue of basing a unified historical narrative on the actions and views of actors who held different worldviews was raised during the design of the study. One of the potential problems that were anticipated was that the different actors might give accounts of the same events that would differ widely from each others'. As data was collected, it became clear that contradictions between different versions were much less of a problem than anticipated. Furthermore, the fact that market network was composed of actors who held different, and even conflicting, views served as an important tool in increasing the reliability and validity of the findings. Particular attention was given to the collection of information from more than one source about all the events of substantial importance that were analysed in the thesis. Then, by comparing the pieces of evidence collected from the different actors about the same events, a comprehensive and a robust historical picture was constructed. For example, the implications of the competitive market maker concept described in chapter 5 were revealed through a critical comparison between the evidence collected from CBOE sources and the data from the Federal Reserve Board.

The existence of a network of connections among the actors had beneficial consequences for the study, as the progress of the inquiry was aided by interpersonal connections among the interviewers to gain access to new

interviewees and expand the breadth of coverage of the market network. However, the existence of network of connections among the actors also meant that actors became aware of the fact that a study about the history of options market was being conducted even without being contacted directly by the study. The fact that news about the study was passed through the market network might have contributed to an amplification of biases in the information given in the interviews. For example, due to a tight-knit network of interpersonal relations among veteran SEC's staff members, the researcher was contacted by retired SEC staff members who volunteered to supply information. Being aware of the possible biases that may be created, the researcher ensured that information about any single topic of the historical narrative would come from at least one source that was not connected directly to others who gave evidence on the same topic. For example, much of the evidence given by SEC sources was compared with evidence on the same issues that came from CBOE sources. This phenomenon shows that the researcher became, albeit for a short time, a part of the market network. Nonetheless, having the privilege of not being associated with any of the groups in the network, the researcher positioned himself dynamically in the 'structural holes' of the network. That is, during the accumulation of information about different topics, care was taken that information about important events and developments would be achieved from separate sources.

The study describes the development of a successful market network. In effect, the proposal to create an organised options exchange and the regulatory approval that the proposal gained were the beginning stages in a phenomenally successful historical process. This may raise the question a possible survivorship bias in the study. Namely, the fact that study focused on a successful market ignored all the attempts to launch derivatives markets that failed. This important issue was taken into consideration during the conduct of the study. First, the study did inquire the possibility that there were other attempts to start an options markets but no evidence was found that that there were any other serious attempts to promote an organised options markets before CBOE's proposal was approved and the exchange showed initial signs of success. Second, in the special context of gaining a regulatory approval from the SEC, survival itself was an important piece of evidence. Chapter 4 describes the considerable degree of effort and

perseverance that was demanded from the entrepreneurs who receive an approval from the SEC to launch a new exchange. That is to say, the fact that CBOE's proposal was successful indicates that under the historical particular circumstances, CBOE's founding team had the adequate resources to initiate a network of connections necessary to start an exchange.

Success of the market network, when studied from this perspective, can also shed light on the ability to generalise from this research. The thesis shows that the success of the CBOE should be attributed to the constellation of different actors who became part of the evolving market network. Those actors did not share a single worldview, and each of them promoted interests that were very different from those of the rest. Considering these factors, it may be concluded that there is no possibility to predict in advance whether CBOE's attempt would be successful, and consequently the ability to create generalisations based on this case would be limited. Such a conclusion would be correct if the framework for the historical analysis had been focused mainly on the exchange, or the founders of the new exchange. On the other hand, the framework used in this thesis, which directed the design and the application of the research methods, takes the evolution of the market *network* as its main point of reference. Namely, the establishment of a financial market is dependent upon the ability of the various actors to create and preserve the connection among them. When seen from this perspective, the ability to generalise from CBOE's case increases dramatically. According to the methodological approach presented in this thesis, the probability of a market to materialise is correlated with the ability of various actors involved in the creation of the market to create a network of viable organisational, political and economic connections among them.

Chapter 4

Creation of a market network: the regulatory approval of Chicago Board Options Exchange (CBOE)

Introduction

This chapter present the first of four historical narratives that explore the evolution of financial derivatives markets. The empirical material in this chapter, the events that surrounded the regulatory approval of the options market, demonstrates the evolution of a market network. This process, as the material shows, exposes the tension between the concept of market embeddedness and the prediction of actor-network theory about the role of actors in the cultural and organisational development of the market. In particular, relations between ideological worldview and the creation of organisational structures and practices will be examined.

During the 60s, the regulation of American securities markets underwent an enormous transformation. The Securities and Exchange Commission (SEC), the regulator of stock exchanges published an influential study of the securities market. The comprehensive study contributed greatly to the level of expertise that existed at the SEC about the structure and the practices of the exchanges. This improved knowledge about the securities markets brought about greater appreciation from the exchanges for the SEC, which resulted in greater ability by the SEC to follow its core organisational values of promoting competition and protecting the small investor. This new trend, in turn, contributed to a creation of a more pro-active regulatory strategy. This strategy consisted of an active participation in the struggles among the exchanges by creating ad-hoc, joint-interest alliances with different exchanges. In addition, the strategy signalled the

rise of the 'market structure' approach to financial regulation in the SEC. This approach focused on rule making (either directly, or by the exchanges) and less on enforcement of existing rules.

These political and organisational changes played pivotal roles in the regulatory approval of the options market. The proposal to establish an organised market for financial options was received as a mixed blessing by the pro-active SEC of the late '60s. On one hand, CBOE was seen as a hybrid market – a synthesis of elements from two worlds that previously had been separate – commodities market and securities markets. The merger of the two worlds, and the consequent exposure of the public to products and trading practices that originated in the agricultural commodities world, was seen as a threat to the investing public. On the other hand, CBOE's intended structure included elements that were expected to promote competition and thus were welcomed by the SEC. This chapter describes the creation of this synthesis, how the regulator and the existing markets, through their different perceptions, conflicting political interests and commercial consideration, contributed to the formation of the modern options exchange.

More specifically, the chapter describes the events that led to the regulatory approval of CBOE, the first organised options exchange. By analysing the constellation of interdependencies among the regulators, the existing exchanges and the new markets for options, the chapter offers a detailed analysis about the shaping of financial markets. Two main intertwined processes are described. First, it is shown how the SEC's regulatory values and political and organisational interests, when translated successfully into the market's network, influenced the shape of options contracts and the structure of the markets that traded them. Second, the chapter exposes how the new concepts presented by the organised options markets gave the SEC a new set of tools for the improvement of its regulatory influence.

The chapter has two main sections. The first one describes the events that led to the creation of the political environment at which the proposal to set up a market for organised trading of options was made. The second section focuses on the

regulatory approval process and the new market environment that evolved as a result. The discussion section at the end of the chapter shows how the historical events described earlier serve as a first step in the creation of a detailed answer to the question of where financial markets come from. The discussion shows that in order to improve our understanding of the creation of markets, the concept of 'market participants' should be expanded to include the various worldviews that take part in such process.

Origins of the SEC's regulatory worldview

In order to assess the significance of the regulatory approval process to the shaping of financial markets, it is necessary to discuss the regulatory values, norms and organisational structure that had developed at the SEC before the appearance of the options initiative. Securities' trading in the US is regulated by an independent federal authority - the Securities and Exchange Commission (SEC). Established in 1934 in the aftermath of October 1929 financial crisis, the SEC was the first federal agency dedicated to the regulation of financial markets. The defining event behind the formation of the SEC's organisational culture was the 1929 crash and the economic downturn that followed it. The events of 1929 and the early 1930s were commonly attributed to the excessive speculation in stocks and options that led to a market bubble and eventually to the crash (Bernstein 1996; Cowing 1995). As such, the SEC's organisational culture included a strong element of suspicion towards the financial markets, an element that was represented in the SEC's contentious attempts to curb out the extreme forms of speculative behaviour from the markets and to protect the investing public from adverse implications of such behaviour (Seligman 1982).

The operation of the SEC follows three sets of Congressional Acts according to which, among other things, the SEC was given the permission to add rules and

regulations (Seligman, 1982).[26] That is, the SEC was given the right to affect the structure of the markets directly. The Acts also set up the two-fold structure for the SEC. First, a decision making body of five commissioners, headed by a chairperson (nominated by the president) – this part of the SEC is commonly referred to as the Commission. Second, serving under the Commission was a large staff composed of professional civil servants whose formal task was to advise the Commission about possible courses of action.

The SEC started to operate in the early 30s and gradually gained a reputation for being a determined and focused financial regulator. In fact, it became to be known as the benchmark for regulatory dedication and effectiveness among the federal agencies (Bear 2002). In spite of its power, in comparison with the historical exchanges, most notably the New York Stock Exchange (NYSE), the SEC was a relative newcomer to an area that those exchanges had dominated for well over a century. This status difference was manifested in the dependency of the SEC on the established markets like the NYSE. For example, many of the initial rules and regulations of the SEC, especially with regard to market practices, were simply copied from the NYSE's rulebook (B* interview). Therefore, although many among the securities markets community respected the SEC for its strict and fearless regulatory approach, the agency rarely entered direct confrontational challenges with the well-established exchanges of New York and the main brokerage houses – 'the really big players' (M* interview).

These circumstances began to changes when President John F. Kennedy, who supported the active regulation of markets, appointed William L. Cary, a former professor at Northwestern University, as a chairperson of the SEC. In May 1961, Cary has ordered on a swift and decisive action against the Re & Re Company, two specialists at the AMEX who for more than six years had been exploiting their privileged positions to defraud customers (SEC Historical Society 2002). The fact that the illegal activity continued for such a long time without being detected by the SEC was seen as an indication that the SEC did not have enough knowledge about the complex practices of the securities markets.

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[26] The 1933 Securities Act, the 1934 Securities Exchange Act, and the 1940 Public Utility Act.

The SEC's congressional oversight committee decided that a special study about the structure and the operation of securities markets would be produced. Ordinarily, such a task would be given to an external team appointed by the committee. However, extensive lobbying by the SEC's staff and chairperson Cary achieved in persuading the committee to allow the study to be conducted by a special force made up of SEC staff (L* interview). This decision, to allow the SEC to conduct the study, turned out to be a crucially influential for the regulator.

In September 1961, the American Congress ordered the SEC to conduct a study of the securities markets. From its conception, it was clear that the study would not resemble previous studies done at the SEC. First, the study team was given a very broad remit and was practically allowed to research every aspect related to the operation of securities markets; such an open-ended definition of subject matter was unprecedented. Secondly, the fact that the study was a Congressional task, gave it priority over most other tasks within the SEC. As a result, the head of the team was given the permission to recruit, on an ad-hoc basis, staff members from any of the SEC's divisions as well as outside experts. In fact, the head of the study himself was an external expert, a securities lawyer from Chicago by the name of Milton Cohen. Cary, the SEC's chairman, suggested the nomination of Cohen whom he held in high regard due to his important role he played in the formation of the Public Utility Holding Company Act in the 1940s (Seligman 1982).

The study was a complex and a momentous task that resulted in multiple volumes of written work and took more than two years to be completed. The study covered a multitude of areas related to the markets' structure and practices: selling procedures, broker-dealer practices, transactions fees, membership obligations and rights and many others (Securities and Exchange Commission 1963). The study documented all of the different variants of practices that the securities exchanges of the time employed. Such a compilation of knowledge about securities markets had not existed previously: market practices were usually based on the particular rules of the exchange and typically differed substantially from their written versions. Therefore, the study became the first report of its kind about the way securities markets operated in practice. Equally

important to the knowledge complied in the study was the change that it brought to the status of the SEC among the regulated exchanges. The securities special study project was a concentrated analytic effort to understand the structure and the operation of financial markets. Gene Rotberg who took part in the study explained:

> My own personal view is that the great quality of the Study is [...] this accumulation of simply how the securities markets work. That quickly became available to everybody on the staff and to the Commission, and in a sense, I think, created a mutual respect between the securities industry and the staff of the Commission -- because they finally said, "Hey, these men and women know what we do for a living".

(SEC historical society, roundtable on the Special Study, p. 24)

Many in financial markets regarded the study as the most up to date information about the sector's strengths and problematic areas. The study's team became the most expert and knowledgeable group of people at the time on the subject of securities markets (M* interview). Furthermore, the fact that the study covered all of the exchanges helped to reinforce the experts status that was granted to the SEC's staff. For example, even experienced traders from any of the exchanges knew very little about the practices in other exchanges. Thus, the handful of the people who composed the team of the study was virtually the only group that had first-hand knowledge about the operation of all securities markets. The improved appreciation to the SEC's professional knowledge served as a basis for the development of a new relationship between the SEC and the exchanges. While before the publication of study many at the exchanges regarded the SEC as little more than a government body to which they had to submit forms, after the study, the SEC has gradually been recognised as a source of expertise. The exchanges began to regard the SEC more as a consulting body. Indeed, it gradually became essential for the exchanges to share plans and ideas with the SEC, not only because they were committed to do so by law, but mostly because it came to be known that among the SEC's staff were some the most knowledgeable experts about securities markets of the time. Stanley Sporkin, who was the director of the SEC's enforcement division in the late 60s, described the effects of the study:

> We had a redistribution of power, which started, I think, with the Special Study. It went away from Wall Street down here to

> Washington. The Commission [SEC] was always a secondary player up until that time. Wall Street was run by [people who] treated the SEC like it was some secondary organization...But starting with the Special Study, it was the emergence of the SEC as the power broker. Everybody looked to it.

(SEC historical society, roundtable about enforcement)

The transformation of the SEC from a marginalized regulator to a prominent power broker in the field consisted of many interrelated processes. The SEC's status improved among the market participants due to the growing recognition that it had become an exclusive source for updated information and knowledge about the markets. Similarly, the substantial content of the regulatory practices changed for both the SEC and other market participants. The growing expectations by market participants to receive knowledgeable advice from the SEC motivated the staff to develop this aspect in of their activity. This, in turn, led to the emergence of 'star regulators' – persons who were regarded as experts in both regulatory procedures and, after the study, in market practices. A prime example for the development of such expert is Milton Cohen, the lawyer who headed the study.

Milton Cohen, who even previously had been regarded as a first-rate securities lawyer and therefore a competent interpreter of the law, was seen after the study as an important constitutive factor in the law-*making* process. The professional leadership of Cohen during the conduct of study was interpreted outside the SEC (by both opponents and supporters of the study) as an evidence for his personal influence over both the professional and the political operations of this organisation. Paradoxically, the opponents of the study contributed significantly to the establishment of Cohen as a prominent figure in the financial regulation landscape. For example, a professor of economics from the University of Chicago, who held strong 'anti-regulation' views, was asked by a Wall Street lobbying group to participate in a series of public lectures aimed at preventing some of the study's recommendations from being implemented. On many occasions during his lectures, the professor referred to the study as 'the Cohen study' (SEC historical society, roundtable on the Special Study, p. 17). It is very likely that referring to the study in this way was aimed at diminishing its

credibility. The result, however, was different. The study was quickly and widely recognised as a milestone in American financial regulation and Cohen, who was seen as the main force behind the study, was gaining reputation for being one of the most influential figures in the field.

As seen earlier, the publication of the study did not only increase the regulatory power of the SEC, but also triggered a transformation in the relations between the markets and the regulator. The SEC's increased ability to implement regulations also stressed the important place that regulation and rule making had in the markets. The NYSE, like most of the other exchanges that were supervised by the SEC had been granted the status of Self Regulatory Organisation (SRO). The implication of the status was that the internal rule making of the exchange was an autonomous process – the SEC was only notified of the rules and could intervene in cases in which rules might were not compatible with the general securities laws. Before the special study, the NYSE created its own rules with very little interaction with the SEC. As the special study was gradually perceived as a proof for the expertise of the SEC, internal rule making involved more interaction with the SEC. Ralph Saul, who participated in the writing of the report, explains:

> I think if I had to give another major impact of the study [...] and its implementation, I think it was the waking up the New York Stock Exchange particularly, and to some degree, the NASD, to the fact that they had important self-regulatory responsibilities. [...] I mean, my God, they are now the primary partners of the SEC in enforcing the securities laws. I think that's a major change, and that in part came from the study.

SEC Hist. Soc., roundtable about the Special Study, p. 58)

The recognition of the exchanges that the SEC was a source of expertise about market practices changed the nature of much of the self-regulatory activities. The exchanges gradually came to see the compulsory report to the SEC about the intention to make a new rule less as formal obligation and more as a starting point for a fruitful dialogue between experts. This change in the exchanges' attitude toward the role of the SEC in the creation of internal rules reflects a fundamental transformation in American financial markets. Not only did the exchanges begin to see the SEC as an integral part of the field, so did the SEC itself. The acceptance of the SEC by the exchanges as a source of expertise to be

reckoned with had a significant influence over the SEC itself. This dual recognition underpinned the development of a more pro-active approach to financial regulation, and ultimately led to the formation of the field to which financial options were presented.

The special study and the evolution of the SEC's new regulatory approach

The recognition of the importance of the study took place both among the financial markets community and among the political establishment that oversaw the activity of the SEC. This dual recognition gave the SEC both the professional confidence and the political backing to tackle thorny issues that previously had not been subject to direct regulatory scrutiny and intervention. The following sections describe how the prestigious status that the SEC gained after the study, coupled with its improved ability to recognise problematic sectors of the markets, played a crucial role in the formation of options markets. This process should be understood in the light of a fundamental change that the SEC was undergoing at that that time – the reinterpretation and the assignment of new organisational meanings to two core values upon which the agency's regulatory vision was based: the maintenance of an equal competitive field and the protection of private investors.

Pivotal in this process was the regulatory relationship between the SEC and the NYSE. The NYSE's seniority in the securities markets field in terms of trading volume, prestige, and expertise were undeniable. Moreover, over the decades the exchange's stable economic prominence has been translated to a significant political influence. For many in the American political system the NYSE represented, more than any other single institution, the responsible and respectable side of financial markets. For several decades after its formation the SEC was, in many respects, operating in the shadow of the well-established and influential NYSE. In fact, many of the rules under the SEC's 1934 Act were virtually copied from the NYSE's rulebook and were applied, via the SEC, to the rest of the American securities markets. This historical circumstance placed the NYSE in a unique position with regard to the regulation by the SEC. Although

all exchanges were put under the same regulatory regime, many at the SEC admitted that the NYSE was not comparable with any of the other exchange (B* interview). Nevertheless, from the mid 50s it increasingly became evident to the SEC that the members of the NYSE were benefiting from the advantageous position that the exchange had in the securities field. In particular, it was noticed that the NYSE specialists[27] were operating in ways that were problematic from the SEC's point of view. For example, a constant point of contention was the fees that non-members had to pay for execution of transactions on the NYSE floor. The fees for the execution of such transactions were set regardless of the size of the transaction or the frequency at which a certain market participants made them. The SEC's position about fixed fees was that they contributed to an unfair competition in the field. Namely, fixed fees put broker-dealers who were not members of the NYSE in a disadvantageous position; they had to pay more for the transactions than NYSE members did and therefore had to charge higher fees from their customers. When the SEC tried to use the NYSE's internal ruling apparatus in order to stop the practice, it frequently faced a problem stemming from the organisational structure of the exchange –the fact that the NYSE was a members' cooperative made actions against specialists practically impossible:

> One of the problems was that whenever we would go in and have an inspection they would find that some of the specialist have done a lousy job, but because they were members of the exchanges and it was a voting system nobody could get these guys removed, nobody could compete with them. They had enough of a voting block so that the exchange could not do anything about it.

(M* interview)

As the issue of fixed fees was seen as a continuous impediment to the ability of financial markets to maintain a fair competition environment, the SEC was seeking to change this situation. A possible solution to such problems was to change the SEC's rules so that the activities of the specialists that were impairing the free competition of other exchanges would be made illegal. However, such a step would have required the SEC to confront directly with powerful members of the NYSE (for example, all of the important brokerage houses on Wall Street were members). Moreover, solutions to some of the problems were beyond the

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[27] Specialists are members of the exchange who were given the obligation to make markets (see, market maker) in certain stocks. Specialists were granted privileges (e.g. monopolistic rights, reduced fees).

then existing regulatory remit that the SEC was granted and therefore could have been made only through the American Congress. In that case the staff, the professional level of the SEC, would have to get the consent and support of the political part of the organisation – the Chairman and the Commissioners – and then orchestrate a persuasive lobbying effort in order to gather the needed votes to change the law. It was unlikely that the pre-study SEC would have either the professional confidence or the political backing needed to achieve any of these tasks. Therefore, from the SEC's point of view the NYSE was not seen only as the most important exchange in the field, but was also gradually regarded as a regulatory challenge waiting to be tackled. To understand the development of the new regulatory approach and how it was applied in the case of NYSE, it is needed to discuss briefly its origins.

The special study and the status change that it initiated also brought a change to the SEC's organisational ideologies and motivations. In the aftermath of the special study, the SEC's new political abilities allowed it to formulate specific motivation to curb out anti-competitive practices from its organisational value that called for the maintenance of fair markets. This organisational value was accompanied by an equally important counterpart – the commitment to the protection of the small, private investors. The regulatory worldview of the SEC included a set of formal normative demands about the protection of the 'individual investor'. These normative demands stemmed directly from the historic events that led to the creation of the SEC, namely the October 1929 crash and the Depression that followed it. For example, in the SEC's constitutive statutory text, the Securities Exchange Act, 'protection of investors' is mentioned as the prime goal of a majority of the sections (Senate 1934). This institutionalised normative demand remained an influential factor in the organisational setting of the SEC and in particular at the period discussed in this chapter.

The organisational values that began to develop after the 1929 crash were echoed again and corroborated in the events of summer 1967, in what became to be known as the 'back office' crisis. A booming stock market overwhelmed the clearing and settlement capabilities of many of the NYSE trading firms. During the summer and autumn of that year trading firms experienced considerable

backlogs of transactions, loss of data, and other problems. During several weeks, the situation became so severe that trading on the NYSE was limited to four days a week in order to limit the flux of transactions. As a result, numerous trading firms went bankrupt and investors' funds were lost (Seligman 1982). In 1968, following the 'back office' crash the SEC was promoting the creation of a federal protective fund for the compensation of investors in cases of bankruptcy of their broker-dealer firms. These efforts were successful and in 1970, the American Congress enacted the Securities Investor Protection Act (Senate 1970). The Securities Investor Protection Act included the creation of the Securities Investor Protection Corporation, SIPC, an independent body responsible for the maintenance of a fund from which private investors would be compensated in case of brokerage failures like the back office debacle.

Therefore, the organisational values in themselves did not serve as sources of motivation for regulatory activity. The values, manifested and institutionalised through an organisational infrastructure, both motivated and enabled the SEC to realise its regulatory vision. For example, the approval process of the SIPC shows how the two values of promoting competition and protecting the investors along with the organisational actor SIPC played complementary roles in the formation of the SEC's new regulatory approach and strategy. During the early 60s introduction of competitive measures had to be delayed or compromised because of the fear that such measures, when imposed on the exchanges, may result in individual investors being hurt. This pattern was particularly noticed when the SEC was working to abolish fixed costs for transactions:

> [A]ny time we wanted to introduce competition in the markets the exchanges would say that the small investors were going to get hurt, firms will go out of business, people would lose their money. As soon as SIPC was in, that argument went right the door. For example, after competitive commissions were approved,[28] one of the NYSE firms came to us and asked for relaxation of [another rule] because they were going to go out of business. That would mean that investors' money would be at risk. They asked the [SEC] Chairman: 'what's going to happen?' and he just sat there and said: 'we'll do what we have to do'. The Commission didn't have to sacrifice [other rules] because SIPC was there to protect the investors.

[28] The introduction of competitive commission rates is described in detail in the following section

(G* interview)

The SIPC case shows that the three actors – the two values of promotion of competition and investor protection and SIPC – were used in a synergist fashion during the development of the SEC's new regulatory approach. Each of the values strengthened the political arguments that were based on the other. Furthermore, as new regulatory structures were put in place (e.g. SIPC), these filled a double function for the SEC: first, realising the regulative norms and second, supplying the norms with practical validity. That is, the market participants gradually perceived the patterns of practice that the new rules imposed as the 'taken for granted' reality. As the following sections show, this norms-affirming aspect of the SEC's regulatory efforts was not limited only to the SEC's rules but also had an effect on the structure of relations among the exchanges themselves.

The dual process through which the SEC's core organisational values were realised and the agency's new regulatory power vis-à-vis the exchanges was established is illustrated through the efforts towards the abolishment of fixed commissions. In the presence of fixed minimum commissions, broker-dealers who were members of any the smaller, regional exchanges, but were not members of the NYSE[29] and performed transactions at the New York market, had to pay high commissions for the executions of the transactions they ordered, regardless of volume of the transactions or the frequency at which they were made. Fixed minimum commissions for non-members were charged in all markets, but because of the dominance of the NYSE, the vast majority of these payments went to that exchange. This fact had put broker-dealers who were members of regional exchanges at a disadvantageous position in comparison with NYSE members, because the former had to charge their customers relatively higher prices for execution of transactions than the prices offered by NYSE members. From the SEC's point of view, fixed commissions were a constant

[29] Membership prices at the NYSE were typically 2-5 times higher than in most of the regional exchanges (Rotberg interview).

violation of the value calling for the maintenance of fair competition in the markets and thus were seen as a structural problem that needed to be solved.

The combination of the political climate that followed 'back office crash' and the rising ambitions of the SEC to increase its regulatory powers framed the motivation to abolish fixed commissions. Ultimately, it was hoped, competitive commissions would bring about a market environment in which investors would be offered better execution prices. However, in the dense social arena of securities markets, this intention also had important constitutive effects on the SEC's relations with the exchanges. The fact that the SEC fought the fixed commissions in practice aligned the regulator with the viewpoint represent by the regional exchanges and against the view of the NYSE. This perceived similarity in actions did not necessarily mean that there also existed a similarity of goals among these actors. However, the fact that the SEC began to show such a level of involvement in the market environment put into motion an organisational behaviour pattern that would prove to be of a determining impact on the development of options markets.

As part of its efforts to abolish the fixed rates, the SEC asked its supervising Congressional committee to set up a series of public hearings in which the NYSE was called to explain why fixed commissions were still needed. Fixed commissions accounted for a significant portion of the NYSE's overall intake. Consequently, the NYSE's representatives at the Congressional hearings opposed bitterly to opening the commissions to competition. A large percentage of the fixed commissions were paid for the execution of transactions by NYSE specialists (M* interview). The specialists were members of the exchange who were given monopolistic and obligatory rights to 'take the other side of the trade' in certain stocks. Each specialist took upon himself or herself the commitment to meet every bid and offer in the stock or stocks with a matching one. The monopoly position was manifested by the fact that each specialist had exclusive access to the exchange's order book of that stock. The specialists' obligation to match the orders placed them in a structural position in which they are constantly exposed to risks. The fees and the monopoly positions were meant to compensate

the specialists for those risks.[30]

In particular, the NYSE's long-standing claim against the introduction of competition to the operation of the specialists was that a competition-driven mechanism for the assurance of liquidity would not be 'economically viable'. This viewpoint was based on the perception that the supply of liquidity – the fundamental premise of the market – had to be guaranteed. Phrases like 'economically viable' reveal the basic differences between the different perceptions of 'the market' in general, that the SEC and the NYSE held, and in particular, the notions about the supply of liquidity to that market. While for the SEC, meaning of liquidity was the assurance of transactions to the investor, the NYSE saw liquidity (and the function of the specialists) as assurance of the structural viability of the market. Thus, the arguments that the NYSE's representative used referred to the structural function of the specialists and disregarded the anti-competitive implications that these monopolistic functionaries had on other exchanges. For example, the phrase 'economically viable' was used frequently in Congressional hearings in which the SEC tried to bring about changes in exchanges rules. S*, an SEC's staff member who headed the hearings team describes:

> They [NYSE] had brought a couple of Nobel Prize economists, at the public hearings, I think that Samuelson was there. I remember cross-examining him. He argued that the commissions would be driven down through a negotiated rate system to a point at which the firms would have 'destructive price competition', which was the term that was used. Therefore, the firms would have to cut back on their expenditures for supervision, quality training, and the brokerage business would therefore diminish in term of its efficacy and its ability to prevent fraud. Using as an analogy what would happen if airlines would have free and openly negotiated rates – they would become unsafe, because they would have spend less money on safety. [...] I remember that the opening question at the cross-examination [after Samuelson presented his argument] was: 'what do you think happen if the OTC market had un-fixed, negotiable commissions?' Unfortunately, he argued that the same thing would happen, that firms would find it very unprofitable. He did not know that there were *no* fixed commissions in the OTC markets and in fact the rates [there] were considerably lower [than in the organised exchanges]

[30] The concept of the specialist market maker is described in detail in chapter 5.

> and there were no adverse consequences. We, I'm afraid, told him that on the cross-examination.

(S* interview)

he Congressional hearings did not bring immediately to the abolition of the fixed commission; the American Congress abolished fixed commission rates as part of its 1975 amendments to the Securities Exchange Act (the 1934 Act) (Securities and Exchange Commission 1975). Nevertheless, as the previous example showed, the hearings were regarded as a resounding success for the SEC. The success of the SEC's staff in presenting a persuasive argument for the abolishment of fixed commission rates while facing strong resistance from the strongest players of Wall Street was an extraordinary achievement for a government regulator. It was the first time that the financial regulator confronted directly and publicly with the most distinguished securities market. This dramatic confrontation in essence put to a comparative trial the professional expertise of the two institutions and the SEC had the upper hand.

The Congressional hearings emphasised the nature of the transformation that the relations between the exchanges and the regulators had undergone. First, in the wake of the Congressional hearing it became clear that the SEC had become knowledgeable enough and mustered enough professional confidence to raise and promote independent initiatives, even when such initiatives would encounter strong resistance from powerful actors in the field. Second, the SEC's active steps for the abolition of fixed commissions, an issue over which the NYSE and the regional exchanges held opposing standpoints, changed the SEC's position within the perceptual network of the exchanges. The more practices there were in which the SEC's staff took part in constructing the market structures and practices, the less it was seen as an external enforcer of rules, and more as a market actor. The findings presented below show that the SEC also used the motivations of the exchanges and the competition that developed as political leverage to achieve its regulatory goals.

The differences between the conflicting worldviews that was brought to a dramatic clash in the Congressional hearings referred directly to the dichotomy between the traditional regulatory view of the markets and between the view held

commonly by other market participants – the dichotomy between the 'normative' and the 'economic' views of the world. As the findings show, this dichotomy was about to be transcended. The fact that the SEC had superior knowledge about the way markets operated *in practice* gave the regulator the ability to develop a new policy. According to this new regulatory strategy, the traditional trade-off that existed when choosing to operate according to one of the two conflicting worldviews was avoided. Instead of applying one of the two external bodies of knowledge – a normative set of rules or an economic one – the SEC started to rely on the practices as they were observed in the markets as a starting point for the development of a regulatory approach. This in effect reversed the flow of knowledge that was related to the performance of financial regulation. Instead of only informing market participants about regulatory requirements, the SEC studied how the participants operated in the markets and then applied this knowledge in its rules. The following section, which describes the options market initiative, shows that this process does not only explain the increased political power the SEC gained, but also reveals how several of the distinctive boundary lines that had existed between commercial and regulatory market participants dissolved and the how the regulator turned into a fully-fledged actor in the market network.

The options exchange initiative

If examined from a more traditional viewpoint, then the approval of the options exchange initiative and the shaping of early options markets may be described as a story of conflicting sets of norms and values. Namely, a dialectical relationship existed between the regulatory vision that the SEC was beginning to realise from the mid 60s onward, and between the implications that the options initiative had on that vision. Such a theoretical approach would conclude that the conflicting relation was solved when the SEC approved the options initiative. Instead, the detailed examination of the historical narrative presented in the following sections reveals the unfolding of a transformation of the norms and a creation of a new regulatory approach. The transformation of the SEC's approach changed

options from a threat to a core regulatory value to a valuable political resource. As the analysis shows, this transformation took place mainly through the connections that the SEC developed with the material and organisational manifestations of the options markets. Hence, the process was not merely the change the regulator had undergone, but rather the change of the network of which the SEC was part. The next two sections of the chapter describe this development of the options initiative and influence and the regulatory transformation that accompanied it. The first section gives a description of commodities markets, the cultural and economic background of the options initiative. The following section examines the regulative and normative meanings of the initiative and the clash of these meanings with the political ambitions of the SEC.

Originally, the commodities-based contracts contained mutual obligations of the buyer and the seller to, respectively, deliver and pay for a specified quantity of the commodity of a certain quality on a set date. Those contracts were concerned with future events and were presented as tools for limiting the risk of farmers and of merchants. For example, a typical contract might include the obligation to deliver 20 tons of potatoes of a given variety and of a given quality at a given date in return for a set amount. The Chicago Board of Trade (CBOT) was the first exchange in the US in which forwards were traded, in 1851. The forwards were designed for the specific needs of the two parties involved in the transaction and were therefore a useful solution for the suppliers of agricultural commodities and for traders who bought the products had no use outside the particular setting. Gradually, as commodities trading became a thriving commercial activity, more traders wanted to trade without being limited by the specific bilateral restriction (Cronon 1991). This was the main motivation for a development of a standardised forward contract – the futures contract. The CBOT (and later, other organised futures markets) standardised the parameters for the commodities that underlined the forwards (e.g. quality, weight, delivery time).

The initial significance of the standardisation process was that any two members of the exchange could become part of a futures transaction by simply buying and selling standardised contracts. The creation of futures also had more profound implications. First, by standardising the terms of the contracts – the delivery

times, the quantities and the qualities of the underlying commodities and the price to be paid – the CBOT had in fact turned the contracts *themselves* into tradable items, thereby creating a new type of product and a new market. While forwards were inseparable from a single, specified future transaction, the tradable futures enabled traders to have an indefinite number of transactions until the expiry date of the contract, each carrying the possibility of making a profit. Second, by introducing the concept of standardisation to modern futures markets, CBOT expanded enormously the range of products that could potentially serve as underlying assets on the basis of which futures could be written. This potential was, in turn, dependent on the ability to standardise the various underlying assets. As the story of the options initiative reveals, the standardisation of contracts, and consequently, their tradability were achieved through a multi-faceted political and technological effort in which both commercial and regulatory market participants took parts. Similarly, as explained in this chapter and in chapter 7, the standardisation concept itself served as a source for powerful and influential commercial motivation. Members of the CBOT, and members of other futures markets quickly realised that the more standardised commodities they succeeded in to defining, the more types of contracts there were to be traded potentially.

The combined effect of the standardisation and increased tradability of commodities futures contracts also played a crucial part in the creation of a distinction between the commodities exchanges and the rest of the agricultural community, a distinction that will have important implications on the development of financial derivatives. First, the standardised commodities and standardised contracts based on them gave the traders the option to end their dependence on the underlying commodities – buying or selling an offsetting contract before the expiry date would effectively negate the trader's obligations to deliver or pay for the commodity. Second, standardisation helped to increase the trading volume in the markets, a factor that contributed to the formation of a new market behaviour that further deepened the differences between traders and others in the agricultural community. While farmers and commodities' spot traders (i.e. those who traded the underlying commodities) were dependent on stable volumes of transactions to make profits, futures traders needed a certain

level of uncertainty in the spot markets for their livelihood. Futures contracts, ensuring a delivery of a commodity at a specified price on a certain date, became more valuable, and their prices rose, as the delivery and the price of the commodity became less certain.

The futures traders dependency on a moderate degree of volatility in the underlying cash markets, combined with the cyclical nature of these markets, served as the main motivation for the expansion trials of the Chicago commodities exchanges. Indeed, these differences in preferences between the traders and the rest of commodities' community, and in particular the relative sensitivity of futures traders to times of low trading volumes and low price volatilities help to explain the underpinning historical pattern of futures' market from which the initial motivation for the options market originated. Over the decades, dozens of different futures contracts were presented in the markets, among them contracts based on a variety of products like plywood, soybeans, frozen poultry and many others (Falloon 1998). The underlying motivation behind all of these contracts was simple: to create a hefty volume of trading from which the members of the exchanges would benefit.

This continuous trend, which expressed the differences between the commodities futures markets and the rest of the agricultural community, reveals yet another important distinction between the two groups. The prosperity of both the agricultural community and that of the commodities exchanges relied on a continuous supply of commodities. However, while for the rest of the community the flux of commodities was a stream of physical goods that were bought and sold, for the vast majority of commodities traders the commodities on which the contracts were written were little more than symbolic representations of the physical commodities. For example, since the contracts themselves were tradable, when they expired, mostly the transaction did not include delivery of the goods. Instead, the traders bought contracts that negated their obligation from the original ones and pocketed the difference between the buy and the sale prices.[31]

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[31] Statistics show that typically only 2-5% of the traded contracts were settled in delivery

The gradual evolution of a new conceptual worldview for the futures' trading community underpinned, and largely, enabled the revolutionary change from agricultural commodities to stock options. The CBOT traders were an integral part of the cultural and economic landscape in which they grew, but in the mid 60s, after several decades of gradual growth in the conceptual distinction, differences between the futures traders and the rest of the agricultural community turned into influential factors. In this period markets experienced a period of very low prices' volatility, partially due to government-imposed minimum prices for the main agricultural products on which futures were based (corn, wheat, soy beans) (Cowing 1965). As a result, volumes in futures markets started to decline. The futures exchanges whose members, the futures traders, suffered from dramatically reduced profits began to look for new products on which to base futures contracts. F*, a leading member of the CBOT at the time describes the situation at the market:

> This was like 1968... and I think our trading volume at the Board of Trade was at its very low and we were looking for a new product to trade.
>
> F* interview)

The CBOT set up a committee composed of members of the exchange that was instructed to find new products for contracts. One of the initial ideas that the committee discussed was to set a contract based on a well-known stock market index, preferably the Dow-Jones Industrial Average. This idea was rejected after consultation with the CBOT's team of lawyers. This team was led by Milton Cohen, who after heading the SEC's special study of securities markets, left the public service and joined a Chicago law firm. Cohen pointed out that it was unlikely that the SEC would approve trading in such contracts that were not based on physical commodities and therefore could only be settled through the transfer of payments (Falloon 1998).[32] Nevertheless, the thriving securities market, a sharp contrast to the dormant commodities market of the time

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(Johnson 1976)

[32] Chapter 7 discusses in detail the historical reasons for the regulatory and cultural issues related to index-based contracts and how those issues affected the formation of markets in these contracts.

motivated the committee members to look for a stock-based solution to the problem of low trading volumes. Consequently, the committee instructed Joseph Sullivan, a newly recruited staff member who was appointed as a research and development vice president for the CBOT, to focus his efforts on the securities markets. R* was a lawyer at the CBOT's law firm during that time:

> There was a lot of interest at the CBOT at trading stock futures, among the [CBOT] membership, What happened, as I remember, was that Joe [Sullivan] had his research guys wander off, particularly to Wall Street. I think they came back with the clear impression that if the securities community would have to sell something [to customers], they'd prefer to sell options, on the theory that they're less risky. [...] [M]y impression at the time was that the mentality of the securities investors is one-way: you take a view on the market and you want to bet on that view. You don't want to suffer the consequences on the event that you'd be wrong. So, to that extent that you could put a safety net under your investment, so much the better and options gave them the opportunity to do that. In the futures situation, god help you should get locked in a volatile market because you're going to lose your shirt. [T]he guys on Wall Street were telling the guys in Chicago: 'we can sell your options to the public a lot easier than we could convert them to being futures traders.'
> (R* interview)

As the quote shows many at the securities community regarded the commitment implied in futures contracts to buy or sell the underlying assets on expiry (or to buy an offsetting contract) as a threatening aspect of futures. As the following sections show, such opinions were merely one part of a broader view about commodities markets, a view held not only by the commercial market participants, but also by the regulator. In late 1968, the CBOT's committee adopted Sullivan's recommendations and decided to develop a market for stock options. This decision placed the CBOT's initiative squarely in the regulatory territory of the SEC. This meant that in order to develop an organised exchange that would trade options the CBOT needed first to receive an approval from the SEC. One of the practical consequences of SEC's organisational characteristic of a having a strong professional staff was that each major proposal submitted to the SEC (e.g. the approval of a new exchange or a new type of contract) had to go first through a meticulous examination by its staff. The CBOT's proposal to trade stock options in an organised exchange had to undergo such a long, exhaustive

approval process. The historical process through which this regulatory approval was given proved to be much more than merely an agreement between two institutions. In effect, the social construct that was created during the approval process had a significant influence on the conceptual and organisational form that options markets took.

Stock options and the SEC

One of the influential factors in the discussions between the SEC and the CBOT's team was the social distance between the worlds of commodities and securities that was implied in R*'s quote. This social distance was firstly expressed by the fact that there was very little knowledge about options among the staff of the SEC. In fact, most of the staff was not aware of the basic concepts of options trading. M*, who was a senior member of the SEC's division of market regulation when the discussions with the CBOT's team took place explains:

> One big problem was that we didn't know anything about options. [...] We had a bunch of guys, many of whom came straight out of law school to work for us. A very few had a little bit of experience with Wall Street law firms and when they saw that they were not going to become partners they said: 'what the hell, we'll try the SEC' and they wanted to see if that would assist them in their search when they would leave the SEC and go into private practice to become a partner in a law firm. I don't recall anybody who came to us after having been a house counsel or a general counsel at a brokerage firm. [...] There was nobody in market regulation who knew the first thing about options.[...] [N]one of us really thought that we really understood options with the exception of [G*] who was an academic economist.[33] There was no major economics staff. None of our lawyers had any experience on the street. We were tabula rasa for this. We had to have things explained to us. Our problem was that we didn't want to approve anything we didn't understand. We wanted to learn about it.
> (M* interview)

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[33] Gene Finn was the SEC's chief economist at the time.

The reasons behind this lack of knowledge expose two structural features of the SEC that were to play important part in the story of options markets. First, a large majority of the SEC's staff was composed of lawyers. As such, the economic and mathematical concepts involved in options trading were not familiar to most of the staff. Second, as this description of the typical career path of SEC's securities lawyers shows, most lawyers joined the SEC armed with only theoretical knowledge about financial markets.[34] The SEC, being a government agency, could not compete with the Wall Street firms for the most qualified personnel and as a result, much of the knowledge that did exist at the SEC about the actual market practices came from experienced staff members or as a result of exceptional initiatives like the special study. The effect of the SEC's limited knowledge about options was exacerbated by the fact that the CBOT's team proposed a type of market that had never existed previously – a securities-based contract that was to be traded in a commodities-style market. Therefore, the mental task that faced the SEC's staff was double: they had to learn and understand what the concepts related to commodities trading meant and they had to critically examine these concepts and appreciate how these concepts could be incorporated into the regulatory system that was developed to monitor and supervise the trading of securities.

Second, the regulatory structure added a conflict aspect to the social distance between the securities and the commodities worlds. Since the beginning of their regulation, commodities markets were traditionally regulated by the Department of Agriculture. In 1936, as part of the Commodity Exchange Act, the American Congress ordered the creation of a branch within the Department of Agriculture responsible for, among other things, the regulation of agricultural futures contracts: the Commodity Exchange Authority (CEA). Unlike the SEC that traditionally focused its regulatory efforts on the market practices (e.g. disclosure procedures, suitability of products, obligations and rights of different market participants) and their enforcement, the CEA, coming from an agricultural background concentrated its resources on the products themselves (e.g. standardisation of quality categories, enforcement of storage and delivery

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[34] Chapter 5 includes a more detailed explanation about options-related knowledge.

standards). Since commodities markets developed through a continuous process of standardisation and classification of products, the regulation of futures by the Department of Agriculture was focused on the products and not on the trading and market structure issues. For these reasons, an impression was created according to which futures markets were very lightly regulated. G*, the SEC's chief economist at the time, describes the common approach among the SEC's staff to the regulation of agricultural commodities:

> It was the Board of Trade that had to come and deal with the Commission and for them it was a hell of a shock because the agricultural people that regulated the board of trade at that time never did anything. They let them do anything they want. Pre-CFTC[35] they did nothing.

(G* interview)

Similar opinion, but from a different perspective, was expressed by C*, one of CBOT's lawyers:

> In that time, there was no CFTC and it was regulated by the CEA, which was a division of the Department of Agriculture. The oversight by the CEA was not nearly as stringent as the SEC's oversight.

(C* interview)

These two elements – the mutual ignorance of the two worlds and the different concepts of regulation – were in large part responsible for the maintenance of the social distance between the securities and the commodities world. This social distance, however, was by no means the only result of the operation of these factors. As the findings presented below show, these factors contributed to the formation of an organisational worldview in the SEC. The accumulation of expertise that followed the special study, combined with the new options initiative provided the SEC with motivation to reinvigorate and to give new practical meaning to some of its core regulatory values: protection of the investing public and the maintenance of fair markets.

Many of the practices that were presented by the SEC as related to its

[35] The Commodities Futures Trading Commission (CFTC) was established in 1974, replacing the CEA. A detailed description about the formation of this organisation is given in chapter 7.

organisational value of 'protecting the public' were based on mediation between the 'public' and the professional markets participants. In the case of commodities markets, the core value of protection was interpreted as a normative demand for the creation and maintenance of an effective boundary line between the 'naïve' and the professional. At the SEC in the mid to late 1960s commodities markets were regarded as the type of market activities from which investing public should guarded. The SEC, as many others in securities markets, whether they were regulators or not, regarded futures markets as 'forums for the professional to fleece unsophisticated or inexperienced investors' p. 56 (Pashigian 1986). This institutionalised regulatory perception had an important impact on the reaction to the options proposal, this in turn had a major impact on the shape the CBOE, and the rest of the field took later on. Therefore, in order to understand the reasons behind the lengthy regulatory approval process that the options proposal underwent, it is necessary to analyse how the differences between the commodities world and the securities world were perceived at the SEC and how the conceptual and organisational boundary lines between the two realms were constructed.

The combination of lack of knowledge about commodities at the SEC, what was perceived as lax regulation, and the fact that futures trading included a future commitment, created the initial suspicion toward the options initiative. However, the element that triggered the regulatory 'defence instinct' was the very element that made futures so successful a century earlier – standardisation. According to Irving L*, the director of the SEC's department of trading and markets, standardisation of options and its implications caused grave concerns at the SEC:

> It was just that before the agency was willing to allow it to go [to approve CBOE's proposed plan], it had to recognize the potentials for overreaching and questioning of protection of the individual retail person who was what they were going after. Because you could get customized options. They [the CBOT team] were trying to make this a general commodity for the individual. That was the primary concern.

(L* interview)

The fact that the options initiative proposed to standardise the contract

incorporated within it the threat that the separation between the worlds of the professional traders and of the general investing public would be diminished. That is, the initiative was to take a financial product that until then was traded in limited numbers and only by a small community of professional traders and bring it to a much larger audience – to the general investing public. Moreover, CBOT's options initiative was regarded as potentially an expansion of the dangerous practices that prevailed in futures markets into securities market where the 'public' traded. This possibility was seen as doubly dangerous as merely the trading of futures markets. Not only that contracts that were conceptually complex would be now based on securities, and thus would enforce the SEC to regulate them, the standardised nature of the contracts would attract the lay investors into that den of sophisticated sharks, where, it was feared, they may lose their hard-earned life's savings.

Regarding this organisational worldview, it is easy to see why the idea of approving a market in which the public will be exposed to commodities-style trading practices was conceived as a threat to the core values of the SEC. In addition to the fact that the organisational *reason d'etre* of the SEC was put under potential threat, many among the SEC's staff felt that it would be immoral to approve such a market and that by so doing, they would betray the American public. For example, B*, who was the head of the SEC's enforcement division at the time recalls arguments among SEC's staff members about the approval of the options proposal in which: 'very hard things were said: 'How can you even think to approve such a thing!? You're a disgrace!' Very hard things' (B* interview). On another occasion L*, the head of the trading and markets division said that options would be approved over his dead body (C* interview).

This organisational vision, which regarded options as an obstacle in to the maintenance of separation between the in investing public and the 'professionals' was still strong when the CBOT's team initially presented its options initiative. Nevertheless, the transformation that the SEC was undergoing at the time, the transition from a regulator that played an external role in the market to a full political player, had a dramatic effect on the core regulatory values that the organisation held. As the findings show, the SEC's regulatory values changed in

a way that turned options from a practically banned financial product to a strictly controlled one. That transformation was not merely a 'softening' of the original view but rather a reinterpretation of it in the light of the new political role that the SEC was aiming to perform.

The post-study years in which the SEC's importance grew in the securities markets' community also signalled a similar increase in the importance of staff within the SEC. Many of the initiatives that were approved by the Commission originated from the staff and, after the success of the Special Study, data and recommendations that were included in staff reports were considered carefully. Similarly, the most indicative area of the strength of the organisational values of the SEC was the opinions expressed by staff members. The expression of those opinions in documents sent to the CBOT team and in meetings was effective in consolidating the SEC's values in the new market environment that was evolving. Simultaneously, this process resulted in a strong opposition to the options initiative and largely contributed to the fact that two years after the CBOT team first made contact with the SEC with regard to the options market proposal, there was still no indication that an approval would eventually be given. The long delay was a direct result of the way the SEC's staff operated. The interaction between the CBOT team and the SEC took the form of gradual detailing process. Typically, the team used to send a document describing a certain aspect related to the operation of the market. The SEC's reaction was then a request for more details about certain areas of the description, followed by further detailed explanations, and so on. This process, which caused much frustration to members of the founding team (F* interview), also resulted in the formation of an elaborate body of knowledge about the structure and practices of the proposed market. Therefore, although the options exchange itself was not approved, due to the detailed exchange of concepts and plans, after two years of such interactions many of the market's trading practice and products were already designed.

The fact that the approval of the proposal was delayed by two years had yet another an unintended effect on the actual approval of the options exchange. This effect, in turn, reveals another layer in the intricate process of the regulatory

shaping of derivatives markets. The construction of the SEC's new set of regulatory practices took place in the context of a broader political change. The political climate at the SEC, as in many other parts of the American administration, had undergone a significant change with the election of Richard Nixon as President in 1968. Nixon did not hide his disapproval of the SEC's interventionist regulatory mode of conduct, and replaced Chairperson Manuel Cohen, who was a staunch supporter of a 'hands-on', interventionist regulatory approach with Homer Budge, a former Federal judge. According to leading figures among the SEC's staff at the time, although Budge held much milder views than Cohen about the level of intervention that the regulator should have in the markets, he actually did very little to suppress the momentum of interventionist activity that existed at the SEC at the time (G* interview, M* interview). The two years in which the Commission was chaired by Budge was the time when the material describing in increasing detail the operation of the options market was accumulating. Budge was not prepared to act directly against his staff's recommendations, thus, his chairmanship prepared the ground for a more dramatic change that came with the nomination of William Casey as the chairman.

Unlike his two predecessors, Casey came to the SEC from the securities business, had extensive connections with Wall Street firms, and in general tended to be attentive to the wishes of that sector. Theodore Sonde, a senior member of the SEC's enforcement department mentioned that:

> [B]ill Casey [...] was surrounded by a number of people who had just come from large Wall Street firms.

(Theodore Sonde in SEC's Historical Society, 2002: 26)

Support from the securities markets community was important to Casey for another reason. Casey was nominated chairperson of the SEC towards the end of Nixon's first presidential term and a short time after he commenced his position in Washington, the early stages of the 1972 presidential campaign started. As a republican candidate, Nixon was hoping to gain political and monetary support from Wall Street firms. For example, shortly after he took office, Casey presented a plan to restructure several of the SEC's departments. (SEC's Historical Society 2002) p. 22-3. These plans had implications on the securities

markets communities and thus it was critically important for Casey, who recruited support for Nixon among that sector, to get support for the plans:

> Casey held industry structure hearings [in Washington] [...] just before he went up to New York for fund raising for Nixon. [...] That's why he had those hearings: to get those guys down there, to get them softened up and then he went to New York where he was going to rake all that money.

(G* interview)

It is safe to assume that CBOT's proposal to open an options exchange was not heading the list of issues that the leading Wall Street firms wished to discuss with the SEC. However, as documents and interview material show, (as in the quote from R* above), both the established securities exchanges and the big New York broker-dealer firms showed interest in the developing options exchange initiative. As described in more detail in the following section, the pioneering effort of the CBOT's team to open an options exchange was watched closely by the securities exchanges. C*, a lawyer on the CBOT's team, mentioned that some of these exchanges, especially the American Stock Exchange (AMEX), regarded the CBOT's attempt as a test case (C* interview). Namely, a first, successful options market would mean that others may also start similar markets without bearing the risks involved in being the first to sail the uncharted water. Moreover, as Sullivan's research in New York showed, the major broker-dealer firms also supported the idea of an organised market for options because, from their point of view, options opened a potential new source of revenue. For these reasons, the SEC's Commissioners and the Chairman Casey experienced little resistance to the CBOE initiative from the securities community.

The initial positive reaction of the securities exchanges to the options initiative should also be understood in the light of the troublesome period that these markets had undergone previously. As result of the general volatile economic climate in the early 70s securities markets were suffering from a long stint in which volumes were low and relatively few new stocks were issued (Kapstein 1994). In similar manner to the commodities markets a number of years earlier, the members of the securities exchanges, whose profitability was reduced during the slow period, were looking at stock options as a product that may help in

returning trading volumes to their markets. H*, who was a staff member of the SEC during this period, explains:

> [Y]ou have also to establish the timeframe here. The securities market has just gone through their worst period in modern times. The period from '71 to '75 was incredibly unprofitable time for securities markets. [...] Options were then sort of the saving grace product in the mid '70s period. Because in an environment of low IPOs, lousy for investment banking, before the hostile tender offer [period] kicked in, options were the only sales product that was selling and making money.

(H* interview)

The connection between Casey and important figures in the securities community brought about a situation in which the interests of the established securities exchanges (who largely supported the options market idea) were represented, by proxy, in the discussions between the SEC and the CBOT's team about the new options market. However, those interests on their own were not strong enough to support an approval of the options proposal, as the majority of the staff was still opposed to it.

Unlike the above mentioned, broad, structural elements, the last two factors that in the complex constellation of events that facilitated the regulatory approval of the options initiative derived from the realm of inter-personal relations. First, Casey's leadership changed the staff-Commission relationship significantly. According to L*, who headed the SEC's division of trading and markets when Casey arrived at the SEC, Casey's management style contributed to the formation of a more influential Commission in the decision making process of the SEC:

> Casey was a very dominant person and probably started what I would think was the control of the chairman over the agenda and really in the policies of the Commission more.

(SEC historical society 2002)

B*, who worked under Casey as the head of the SEC's enforcement division mentioned that Casey was 'a very demanding boss', especially when the matters concerned making of decisions (B* interview). For the SEC's staff of the early 70s this was a substantial change. In the years after the special study the staff, and especially the more senior members of it, became used to operating in an

organisational environment that was receptive to new ideas, and in which, frequently, those ideas won the support and the backing of the Commission (as the commissions hearing case showed). Thus, an opinionated chairperson who promoted a definite agenda limited the ability of the staff to influence the outcome of the SEC's decisions. More specifically, knowing that the staff were largely against the proposal, the arrival of a strong chairman was good news for the CBOT's team.

Second, the legacy of the special study came to the fore again, only that this time it affected positively not the SEC's staff, but the CBOT's team. As mentioned earlier, Milton Cohen, the most respectable name to come out of the securities special study, was heading CBOT's options initiative. Casey, in spite of holding different views about the role of the financial regulator from Milton Cohen, acknowledged Cohen's expertise and respected his opinions. Therefore, Cohen's presence gave the CBOT team a 'direct line to the Commission' (C* interview) – the ability to present ideas and plans directly to the commissioners and the chairman without having to go first via the staff.

In late summer 1971, more than two years after the CBOT first presented the options proposal to the SEC and after an extensive exchange of documents and many meetings, Cohen requested a private meeting with Casey. According to Cohen, the only remaining witness from that meeting,[36] Casey was convinced about the options concept and simply asked what order to give to the staff so that the options initiative would be realised (CBOE 1998). Cohen's status as one of the most respected securities lawyers of the time, and especially the respect and appreciation from which he enjoyed at the SEC played a major role in securing the regulatory approval for the options market. However, as this section shows, Cohen's status was just one factor among many that played part in the regulatory approval of the options exchange. The changes in the general political climate of the American administration, and especially the closer relations between Wall Street and the SEC had significant roles in bringing about the regulatory approval. Having said that, the formal agreement between the regulator and the

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[36] William Casey died in 1989.

initiators of the options exchange was only another step in the gradual formation of the new environment of options markets. In particular, as the following section shows, the SEC's core values were not discarded because of the approval. On the contrary, in the environment that was created after the approval the organisational norms regarding competitiveness and protection of the investing public played even a more decisive role than they did before organised options markets existed.

Options markets in operation

In October 1971, the SEC gave its consent for the opening of an organised exchange for the trading of options. Nevertheless, the particular constellation of persons, events and interests that resulted in the approval to trade options did not create an overnight change in the institutionalised views of that the SEC's staff held about options. Options were still regarded as an exceptionally dangerous area of the financial markets. For example, the official regulatory text that introduced the options exchange includes grave warnings about the possible implications of the trading in the new contract:

> The Commission is of the opinion that in addition to the novelty of exchange option trading, such trading may involve complex problems and special risks to investors and to the integrity of the marketplace.

(SEC, 1973) p. 1

The warnings implicitly refer to the two areas at which options were conceived as threats to the SEC's values – protection of the investors and the ability to maintain fair and competitive markets. A different SEC rule from the same period helped in creating an operational framework for the SEC's other core regulatory value – protection of the investors – with regard to options:

> The rule require[s] the broker or dealer to have a reasonable basis for believing, after reasonable inquiry and before recommending any transaction in options to any customer, that the transaction is not unsuitable for the customer.

(SEC 1973)

The approval of the options initiative made the maintenance of the separation between securities markets and commodities markets impossible. From the SEC's point of view, this situation left the investing public exposed to possible manipulation by professional traders. In effect, this rule shows the beginning stages in the creation of a new legal and organisational subject – the options broker-dealer. Needless to say, broker-dealers existed in securities markets and were subject to regulatory scrutiny then. In contrast, as the quote shows, in options markets broker-dealers were requested to be specifically vigilant and to assess the suitability of the products to prospective customers. Thus, the broker-dealers were practically assigned as gatekeepers, selective buffers, who would help to monitor the transfer of customers from one realm to another. As the following section shows, the values embedded in these rules were part of a special regulatory framework that was designed to monitor and regulate the activity in the newly formed market. The new options market - the Chicago Board Options Exchange (CBOE) – was given the regulatory status of pilot programme. This status implied that the continuation of the regulatory approval was dependent on satisfying not only the initial requirements of the SEC, but also additional ones that may arise in the duration of the pilot programme. In addition, the SEC ruled that any changes or additions to the practices or structure of the options market would be brought to the approval of the Commission. The exchanges' alterations would be applied only after examination and approval. (SEC 1973) p. 2

The pilot programme status and the practices it entailed were the basis of the organisational infrastructure through which the SEC participated in the shaping of options markets. Naturally, the status expressed the cautious suspicion that still existed at the SEC towards options, but this does not fully exhaust its implications for development of options markets. First, the status of CBOE as a pilot programme created a framework for a set of practices that otherwise would have probably been regarded as overly interventionist by the exchanges. Thus, the pilot programme status helped to lower the political cost of regulation and helped to legitimise it. Second, the obligation of the CBOE to provide detailed

reports about their intended moves gave the SEC the ability to accumulate first-hand information on the practices in options markets as these developed. By so doing, the SEC hoped to maintain a similar knowledge base to the one that was translated so successfully to political power after the securities special study.

The SEC's dual challenge – to maintain its political power among the exchanges and, at the same time, to keep practicing its organisational core values – seemed even more demanding after the approval of the first options market. The SEC had to prove to the regulated markets that it had not lost its motivation and vigour although the Commission approved options that the staff opposed to so strongly. In addition, also because of the approval, the SEC was facing a growing regulatory field as more exchanges followed the initial success of CBOE and submitted their own plans for the trading of options. This set of circumstances meant that in order to follow its organisational value that called for the encouragement of competition, the SEC had to play an active part in the competitive field, and in particular, between the more established exchanges of the East Coast and the 'regionals' – the regional exchanges. Maintaining the competition according to this regulatory perspective implied that the identity of the 'favourite-underdog' combinations and the issues had to change constantly.

The American stock exchange (AMEX) in New York was not a 'regional' exchange in the full sense of the word – it was not the only stock exchange in its area. However, other characteristics motivated the SEC to assign the 'underdog' definition to the AMEX. For example, M*, who was deputy director at the SEC's division of market regulation in the late 60s and early 70s, explains:

> I was very pro-competition. It was obvious that you do anything you can to encourage competition. That meant keeping the regional exchanges alive. They never really competed in a major way with the New York market [NYSE]. But they did a lot of things; they came up with a lot of innovations in trying to do so, in trying to compete with [NYSE] members' business. Competition was very desirable. Even if it wasn't successful, it had a healthy impact and I wanted to help [...].

(M* interview)

The declared rationale behind the encouragement of competition, as the quote

shows, was directed at bringing about a better market environment for all of the participants. However, the practice through which this end was promoted also served another goal – the enhancement of the SEC's regulatory power. As the options trading in CBOE was entering its second year (1974), the SEC received a similar proposal to that of CBOE, for the trading of standardised options, from AMEX. Granting quick approval to AMEX's proposal would mean that the young options exchange in Chicago would face direct competition from an early stage. This in itself was not the main reason that promoted the staff of the SEC to recommend to the Commission to accept the proposal:

> The AMEX came in… they had something that was interesting to us. […] AMEX said that they were not going to be trading options on AMEX-traded stocks, just NYSE-traded ones.

(M* interview)

The fact that the AMEX intended to offer options that were based on NYSE-traded stocks was interpreted by the SEC as a factor that would increase the potential competition that NYSE would be facing, at least at the New York region. This interpretation was based on the assumption that the NYSE would also want to enter the options market in the near future. The common opinion about this possibility at the SEC was that the trading of both the stocks and the options based on these stocks at the same exchange, especially in a in the young market environment of options would enhance further the dominance of the NYSE. Therefore, if the AMEX proposal would be approved quickly, the NYSE would enter a more competitive not market for NYSE-based options. Therefore, by allowing the AMEX to trade options, the SEC promoted competition and increased its political power with regard to the NYSE. Such use of options as means for the creation of political power in the regulatory arena was possible because of the restrictive regime that the CBOE's pilot programme status implied for the entire options field. Originally, as seen before, this regime came as a reaction of the SEC's staff to the threat that options represented to the motivation to protect the investing public from professional traders. However, by taking part in shaping the new market environment in which options were traded, the SEC turned options from a threat to a resource.

The network connections and practices through which the organisational value of competition was performed had multiple implications on the shaping of options markets. Although many at the SEC were still sceptical about the potential success of an organised exchange for options, they nevertheless operated in order to create an environment in which several options-trading exchanges would compete. Moreover, the evolving options markets were not seen only as the arena in which competitive activity would take place: options themselves were as seen as tools for the creation of such an environment. The use of options as tools for the promotion of a competitive environment was most visible during the discussions between the SEC and the AMEX, about the exchange's proposed options programme. These discussions took place while CBOE was already trading options, but was still subject to the restrictive pilot programme status. G*, the SEC's chief economist at the time, describes:

> When the CBOE went into operation in 1973 the Commission, I felt was dragging its feet on approving CBOE options because the AMEX was going to go out of business if it didn't have options. AMEX was in terrible, terrible shape. I don't think that the AMEX would have survived if they had not got in the options business.
> (G* interview)

One of the demands of the pilot programme status was that new options that the exchange wished to add (i.e. based on stocks that were not used before as underlying assets) would need to be approved first by the SEC. This requirement was included in the pilot programme in order to control the underlying stocks that would be used for writing of options. The main concern behind the step was that options written on stocks for which a liquid market did not exist (or for which it was probable that illiquid market conditions may develop) might create situations of high volatility in the stock markets as traders who would need to buy or sell stocks as part of their options contractual obligations would drive prices sharply. In extreme cases, it was feared, such demands may cause traders not to be able to fulfil their obligations at all and thus damage the credibility of the options markets. These concerns served as the motivation for the rule, but as seen earlier, the praxis that evolved in the options market gave additional meanings and uses to the rule. The SEC was using the rule as a method to control not only the identity of the stocks that would be used for options, but also the timing in which those options would be added to the market. In so doing, the

SEC in effect used the approval of options to encourage the creation of a multi-exchange competitive environment.

Such ad-hoc cases helped the SEC to construct a set of organisational practices through which competition value came into being and the regulator's power in the inter-exchange arena indeed was increased. However, as options became more popular and more exchanges applied for trading programmes, the use of a bilateral framework for management of the field became increasingly cumbersome. In the example above the SEC was trying to control the competitive ability of AMEX in comparison with that of CBOE, the only other major options exchange in existence at the time. As more exchanges began trading options and wished to expand their trading repertoire, it became increasingly harder to predict the outcomes of such regulatory interventions. The SEC then created a more systematic way to control the new resource that has developed in options markets – the access to underlying stocks.

As the trading of options became more popular and especially as options gradually became a prominent element in institutional investors' portfolios, the demand for options on more stocks increased.[37] Supply, however was restricted by a combination of two SEC's regulations. First, the SEC ruled that only highly capitalised stocks that were regularly traded in large volume would be allowed to serve as basis for options. This restriction limited the available stocks on which options could be written to a narrow group. Second, multiple listing of options on the same stock was not allowed until the mid 80s. The meaning of this restriction was that only a single exchange was allowed to trade options on a certain stock at any given time.

As in the previous rule, which simply restricted the access to options, the initial reason for this rule was the will to limit systemic risk. The concern was that multiple listing would encourage arbitrage between the various options markets and this, in turn, would be translated to concentrated demand for certain stocks

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[37] This aspect in the history of options markets is described in more detail in chapter 6.

and would increase market volatility at the typically volatile hours that precede the expiration of options. The common hypothesis at the SEC about the dangers of multiple listing of options was that most arbitrage transactions would take place on the trading day in which the options were to expire. It was believed that on that day, close to expiry, the discrepancies between the prices of the options in the different markets would be the biggest, due to different demands for the underlying stock (T* interview).[38] The SEC itself, after selecting the pool of stocks that were allowed to serve as underlying assets for options, allocated the stocks to the exchanges. The CBOE and AMEX, being the two initial competitors in the field were the first two exchanges that were allocated stocks, and witnessed the power-creating aspects of the rule:

> The Commission was holding back when they began the allocation process [of stocks on which options were to be written]: 'you get so many, you get so many'. In other words, they would not give CBOE more because they had to give more to the AMEX. [...] [W]hat happened was that CBOE came in and ask for more stocks [to write options on] and the Commission would say: 'well, you've got to show us that your anti-manipulation is complete' and the CBOE would tell us: 'tell us what to do' and the Commission would say: 'well no. You've got to propose what you should do'. [...] And the thing was that the AMEX would come in and say: 'these are our rules and they are the same as what the CBOE got' so – bingo, no problem. [...] [F]or whatever reason the delay was enabling the AMEX to get up to speed, to get their operational thing ready so they could start getting stocks. I think that CBOE had about 30 stocks and then the AMEX started getting stocks. It wasn't very many. I felt that CBOE's lead was probably cut in half by regulatory delay. That was my perception that the AMEX needed it badly. The two problems were happening at the same time: AMEX was having a hell of a time, CBOE was trying to get more stocks and was having trouble getting them.
>
> (G* interview)

This example shows how effective was the use of rule for the achievement of the dual goal of the SEC: the creation of a competitive multi-exchange field while maintaining a large degree of dependency of the exchanges on the regulator. Furthermore, the ban on multiple listings in different exchanges in effect

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[38] The SEC later changed policy about multiple listings and even advocated that inter-market arbitrage that followed multiple listing has contributed to a more efficient marketplace (Levitt Speech, 1995)

institutionalised the practices through which the SEC exerted its power over the exchanges and helped the control of access to options to become a relatively standardised process. From the exchanges' side the effects of this strategy were significant. The turning of options from a threat to a political resource brought about a structural situation in which having access to stocks became a determining factor to the success of the exchanges. P*, who at this stage was the chairperson of CBOE, explains:

> For a long while there were plenty of good stocks left to be picked. Like the old Civil War saying goes: 'Whoever get there first is probably going to get the most.' Almost without exception whichever exchange that listed options on a stock first had the dominant market share trading in options on that stock. So our ability to [expand] was all predicated on [...] the fact that the AMEX were being held off.

(P*, interviewed by MacKenzie)

Although the purpose of the SEC's ban on multiple trading of options was, among other things, to promote competition, the restriction also contributed to the creation of a turf war between the options exchanges that in effect impeded the competition. For example, in August 1975 the AMEX filed a civil suit against CBOE accusing if of submitting a false application to issue options on Boise-Cascade stock while not having the actual intention to use the stock for options, in order to prevent AMEX from using the stock (Poul and Cohn 1975). Naturally, such a consequence was not an intended result of the SEC's strategy. However, the case shows how powerful and effective was the organisational and normative structure that evolved in the options exchanges field. As the chapter shows, limited access to options was a result of a compromise between the regulator's worldview and specific political circumstances. This compromise played an important role in the shaping of options markets and, as the example above shows, structured the relations between the different market participants.

A more general look at the options market corroborates this analysis. It is plausible that CBOE was suffering from the fact that it was indeed the pioneering market. Namely, the CBOE had to prove to the SEC that its market infrastructure and its practices were sound and safe – a long and costly process – while the AMEX, and other markets that followed, simply had to copy the already-approved CBOE regulations. Accordingly, it would be safe to assume that a

regulatory piggybacking process followed this circumstance. However, had this process been the most influential driving force behind the spread of options markets one might expect, given the proved profitability of options markets at that stage, that all other exchanges would copy the CBOE model and gain swift approval from the SEC. This did not happen. Although 10 of the 12 securities exchanges either submitted proposals to trade options to the SEC or discussed such proposals, only two of the regional exchanges were approved to trade options in 1974-5: the Pacific Stock Exchange (PSX) and AMEX. L*, the director of the SEC's division of market regulation, and later a commissioner, summarised the SEC's strategy at that period:

> That was the advantage of keeping the regionals [regional exchanges] alive, they gave us the weapon of competition.

(L* interview)

This quote captures in many respects the mode of operation that the SEC established in the new options environment. That is, the use of the competitive field as a leverage that increased the SEC's regulatory influence and political power.

Discussion

This section reviews several of the findings and shows how a more detailed explanation about the historical events can be offered. To demonstrate this, the discussion will return first to some of the theoretical perspectives presented in chapter 2. It can be claimed that the findings display the effects that social networks and pre-existing cultural structures had on the shaping of options markets. As discussed in chapter 2, Granovetter (1973, 1985) and Baker (1984) presented the hypothesis that markets do not only create social structures but are largely products of pre-existing social networks within and among communities. The initial notions about options that were expressed and promoted by the SEC – the organisational suspicion toward commodities markets and the motivation to separate between them and the investing public – could be described as the cultural heritage of the regulator. In other words, those were the networks in

which the SEC was embedded when the options proposal was presented to it. The findings also show that the particular contents of those embedding networks had a significant effect over the shape of the market networks. The assignment of a pilot programme status to the options exchange can be attributed to impact that the cultural network in which the SEC was embedded – the effect of the 1929 crash on the regulative mindset.

Useful as these theoretical perspectives are, the material in this chapter shows that using only a structural characterisation of the market network would limit the scope of the analysis that can be produced. The effect of the securities special study on the status of the SEC among the exchange could be regarded as structural change. Namely, the SEC managed, through the knowledge collected during the study, to position itself in a 'structural hole' – the SEC was the only sources that had the quality and the variety of knowledge about securities markets at the time. This attempt was successful not only because of the initial structural effect it had, but similarly because of the feedback effect that followed it. Initially, representatives of securities exchanges that had connections with the SEC due to their regulatory obligations realised that the regulator had become a source for knowledge. However, this structural analysis does not cover all of the aspects of the process. The new information about the SEC' expertise had become common knowledge among all of the actors that were related to securities trading and gradually, the notion that the SEC had the best experts gained the status of a social fact. That is, not only exchanges that were regulated by the SEC began to see it as a source of information, but also newcomers to the regulatory field, such as the CBOT's founding team, were learned to accept the expertise of the SEC as a taken-for-granted feature of American financial markets.

Therefore, the transformation of the SEC from a 'secondary player' to 'power broker' cannot be explained only by referring to the realignment of direct connections between the actors, but also has to account for the connections between both the SEC and the exchanges with another actor – rules of the self-regulatory organisations (SRO's). Before the special study, rules were typically copied from the rulebook of the exchange for which the rule was to be applied.

Hence, the rules did not come as result of discussions and negotiations between the regulator and the exchanges. However, as the realisation that the SEC was a source of expertise and not only of bureaucratic authority, the process through which SRO rules were created changed. As the material shows, one of the noticeable changes to practices that the special study brought about was that exchanges and the SEC cooperated closely when formalising these rules. Therefore, if this historical development is regarded from the perspective of actor-network theory as well as from the 'social' network perspective, a more comprehensive explanation can be produced. The change in the status of the SEC was caused not only because the position of the regulator became more central but also because a non-human actor – the rules – also had more connections attached to it. Both the SEC and the exchanges put more resources into the creation of SRO rules and in doing so placed the rules in a more central place in the market network than they had earlier. That is, the SEC's status change was dependent not only on the structural changes that the special study caused, and amplification of those changes, but was also related to the more elaborated practices that were now attached to the creation of SRO rules.

In addition, the examination of the historical case can add to our understanding of the notion of worldviews in the market network. From a first look, the regulatory approval of CBOE may be described as an outcome of a struggle between two normative claims that existed in the SEC's regulatory worldview – supplying protection to the investing public and encouraging competition. However, the detailed historical account shows that ideological elements like 'competition' and 'public protection' did not exist as independent forces but rather as relational ones. That is, the ability of various actors to use ideological elements as sources for motivation was dependent on the positions that the actors had in both market network and in the perceptual network attached to it. For example, for the SEC the notion of competition included an inherent component that called for abolishment of the structural advantages of the NYSE. That is, the notion of competition was not an abstract concept that was simply applied to a case or series of cases, but rather was embedded in the market network. In other words, the organisational motivation was bounded by the material, political and organisational conditions of the market.

Chapter 5

The Options Market Makers: The culture of the Chicago Commodities Markets and the Black-Scholes model.

Introduction

Chapter 4 described one aspect in the formation of options markets – the development of the new regulatory framework that facilitated the approval of CBOE. This chapter provides a focused analysis of a parallel development: how the practices used for the trading in CBOE's options were developed.

CBOT had a long history as a commodities market, and over the decades, a set of norms and values developed that not only governed the way trading was done in CBOT, but also helped in shaping an identity – 'the Chicago way of doing things' (F* interview). As this chapter shows, this social and organisational identity was by no means discarded when the SEC approved the new options market to operate. The creation of CBOE was the result of the realisation of the 'Chicago way' through the developing trading practices of options, and more generally, through the management of an options exchange. This chapter focuses on the evolution of an important aspect of the early organised options market, and of today's financial markets, that of the market makers. The chapter shows how the CBOE market maker concept evolved from the Chicago markets cultural heritage. This chapter is focusing on the influence that the Chicago commodities culture had on the creation of modern options markets. This aspect of the historical analysis reveals an additional set of actors and concepts that contributed to the development of the market environment. The development of the organised options exchange triggered the creation of a new market environment, but simultaneously it signalled a revolutionary transformation in the conceptual worldview that underpinned commodities markets themselves. As

this chapter shows, the new organisational and technological features of options markets did not replace those of the commodities markets, but were combined with them in a way that created a synthesis. The chapter adds another layer to the complex picture in which regulatory and commercial market participants interacted. The analytical description offered here shows that the Chicago commodities culture influenced not just the design of the options exchange but also the techno-social nature of markets' regulation.

The Commodities markets ethos and early CBOE

As shown in chapter 4, CBOT's success as a market, being a members' exchange, was based on its ability to attract high volumes of trading. Although many of the members executed orders for others in times when trading volumes were low, the backbone of the economic activity, and, in return, the main supplier of liquidity, were the transactions made by members using, and risking, their own money. This mode of trading, known as 'market making' was comprised of high frequency of transactions, in any of which the expected profit was relatively small. CBOT members were aware of the fact that in order to make a profit while making markets, trading volumes needed to be consistently high and prices should change frequently.

In a way, the market makers' view of the world was an extreme version of the CBOT in general. That is, the existence of futures as a viable concept was dependent on maintaining certain levels of trading volume and of volatility. The market makers were dependent on high trading volumes and the price volatility for making profits even more than the rest of the traders. Having said that, the market maker concept was not only a means to an end in the Chicago commodity markets – it had cultural and social significance that was of fundamental importance to the identity of the trading community. The concept grew to be a significant part of the Chicago commodities markets ethos. This ethos had two main components: a strong motivation for individual achievement and an equally influential motivation. Commodity traders believed that trading for one's own

account was an embodiment of the meritocratic spirit that the market represented. Trading for one's own account brought to the fore one's trading skills and put them to the test on every trading day. The term 'trader' in the Chicago commodities jargon refers to a market maker. The ethos also included a strong individualistic sense: success or failure were attributed chiefly to the individual's ability to 'play the market'. That is, one had to be skilful and courageous enough in order to make profits.

In the interviews there were frequent references to 'legendary' traders whose courage and intuitive understanding of the market brought them wealth and gained them respect in the trading community. It has to be noted that the individualistic ethos refers mostly to a particular aspect of trading and less to the practice as a whole. Floor trading is never conducted entirely by a single person. Each trader is always assisted by several others who operate alongside him/her: runners, clerks, and others. So, in essence, trading is always performed by 'trading units' – small groups of people who work together. However, a specific part in the trading process – the fast-paced decision-making – is done mostly by a single person, the trader. This is the major focal point of the traditional Chicago markets culture. This is the most significant point at which the skills and expertise of the trader are translated into action. In many respects, this is when markets are performed.

The individualistic aspect was accompanied by another influential cultural thread that existed in the CBOT ethos. A strong communal ethos existed in the commodities markets, either based on family relations or on a more general generational commitment. An integral component of this ethos was that traders learned and honed their skills through a system of apprenticeship. However, since such a method of active learning could have serious financial consequences in case of a wrong or misguided decision by the trainee trader, the relationship between the young and the veteran trader also included a strong element of commitment and shared responsibility. For example, prospective members often received loans or even money gifts to help them pay their initial membership fees (known as 'seats'). F*, a CBOT veteran trader who took part in the founding of the options market describes the relations:

I [...] came to the Board of Trade as a clerk at the age of twenty, became a member and a pit trader on my twenty-first birthday. [...] My partner and I[...] had mentors. One of my mentors was an Irishman by the name of Jim McKerr. [...] He brought me in as a clerk, financed me, loaned me money. When I bought my first membership I did not have the money, and I want you to know it was about $2,500. He loaned me the money to buy the membership and when I came back from the service (Korea), things were tough then. I went to work for another Irishman, Haggarty senior, the old man. They were wonderful to me and I got my membership back and he wanted to give me a job. I told him: "You don't understand. I have an obligation to Jim McKerr, and I'm going to clear and be his customer, not yours." I expected him to say: "That's very nice, here's the door, goodbye." Instead he said: "I can understand that. As a matter of fact, I respect you for it, your job here is secured." [...] So I became a customer with him. I felt obligated, and in about two years I developed into a pretty good trader and paid a lot of commissions. I was a very good customer, and that's when I realized the only way I could survive and compete was to [become a member of the clearing house, which settles trades and guarantees transactions]. I still didn't have any money because in those two years I was paying lots of debts. I was now even. I went to Jim McKerr (that was in 1956) and said: "I'm going to start clearing." He said: "That's wonderful, I think that's a great idea because it's the only way that you can compete, but what are you going to do for money?" I said: "I'm approaching that right now." He said: " What do you need?" My share was $15,000 in order to start a clearing firm and Jim said: "Okay" and reached in his pocket and wrote me a check for $15,000. I didn't even ask. I said: "How in the world can I ever thank you?" And he said: "You have a debt, but the debt is to youngsters that come on after you. You can repay me by helping other kids." [...] I was inculcated that I had an obligation to those who follow you. [...] Many years later, when the Options Exchange was in existence, I was a clearing member and I was taking a lot of young floor traders as customers. One

day Jim McKerr came visiting from Florida where he was living at the time, he was eighty years old. He came walking into the office and I introduced him to some of the kids who were sitting around. One of the kids jumped and gave him a big hug. Jim looked at him – he was rather reserved – and said: "What's that for?" And the guy said: "Mr. McKerr, I owe my career to you. Whenever I came to [F*] to thank him, he told me about you and he said that he was returning your help." When I took him down to lunch there must have been twenty people who shook his hand, people he had never seen or heard of. But this was his legacy and we have passed it on.

(F* interview).

This intergenerational commitment also contained a normative code. Young traders were expected not only to perform successfully on the trading floor, but similarly to conduct their other economic matters responsibly. In The CBOT, communal commitment was expressed in many occasions on the trader's 'life cycle':

The first thing to buy is a membership, then they would come in and say: 'I want to buy a Jaguar' I always asked: 'Where do you live?' They would say: 'I have an apartment I rent'. I say: 'Next thing, you buy a house.'

(F* Interview)

The communal commitment had not only on the informal normative structure of the trading community but also had significant implications on the organisational development of the new options market.

In order to understand how the concept of market maker came about, it is needed to discuss the cultural background of the CBOE. The development of CBOE reflected in many respects the cultural preferences of the Chicago commodities community. The individualistic thread in the Chicago worldview regarded market rules and regulations as means to an end. According to that view, rules

were there to help the traders, and the market as a whole, to maintain smooth and trouble-free trading. In other words, rules and regulations in the markets were there so that the traders, the skilful individuals risking their own funds could operate as efficiently as possible. The founding team of CBOE was aware of the inherent tension between the motivations of the individual traders and the structural aspects of the exchange. The founders saw the established NYSE as an institution in which such tensions were not solved but instead promoted an opposite idea, where rules were enforced on the traders 'from above', not created on their behalf. For this reason, according to a widely held belief, there existed a wide discrepancy between the traders' needs and the rules of the exchange. The Chicago community tended to believe that the NYSE's rules were largely being 'bent', thereby making them more compatible with the actual trading practices that took place on the floor. F* was a member of a CBOT committee that was responsible for the design of trading floor procedures in the new options market. As part of the design of the CBOE's founding committees, the trading floor committee took a trip to New York to study the NYSE's trading procedures:

> They [NYSE people] were all very sanctimonious about their adherence to the rules. I talked to a broker on the floor of the NYSE and I asked him: 'How do you get around the short sale rule?[39] I know that you buy like that every day of the week... I want to know how you do it.' They would not answer that on the floor. Later on we went to lunch together and in about 10 minutes I found out how they circumvented every rule in the exchange. When we came back, the committee said: 'We know what's good and what's bad about our rules and we know how we circumvent our rules and we now know how they, in NYSE, circumvent their rules. Let's create a set of rules that we can live with.' We wanted to develop a system in which you don't have to circumvent rules. Where the rules follow the natural flow of the trading environment.

(F* interview)

This quote represents the ideal market that the founding team was trying to create: a market in which the rules would help the individual trader to trade and make profits rather than stifle those efforts. Furthermore, CBOE's rule making

[39] The practice of 'short selling' is discussed later in this chapter.

process included an implicit, but nevertheless a strong, moral sentiment: the exchange's rules should reflect the 'natural flow of the trading environment'. In other words, CBOE's rules were supposed to help not only the individual trader, but also to assist in the creation of what was seen in Chicago as the true nature of the complex social activity that was trading. As the findings in this chapter show the set of concepts of a perfect 'traders' market' was not an exclusive cultural template according to which CBOE was designed. Instead, the culture of the commodities markets should be regarded as a node in the network in which, thorough an interactive process of influences, options markets were shaped.

One of the important constructs in CBOE that clearly bears the mark of the 'Chicago way' was the innovative system of market makers – CBOE's mechanism for the supply of liquidity. Liquidity in financial markets refers to the ability of market participants to complete transactions at any given time and to the relative absence of undue price effects. Put simply, in a perfectly liquid market, there is a corresponding buyer for each seller and vice versa. Consequently, in a liquid market, there will exist a viable price for every traded item. In other words, if the exchange quotes a price, and the market is liquid, there would always be a person willing to buy or to sell for that price. One the most important factors for the exchange is liquidity: the ability to attract the public to a market is highly correlated with that market's ability to maintain its liquidity.

As discussed in chapter 4, following the influential NYSE, the first securities market in the US, many of the American national developed and used variants of the same system to assure liquidity – the specialist system. By the late 1960s, the specialist system was the de facto standard in all of the American securities markets. According to that system, a person was granted the responsibility to take part in all the transactions of a given stock – to be a buyer for the sellers and a seller for the buyers, thus making good the exchange commitment to complete transactions at the price quoted to the public. The specialist, as its name implies was given exclusive trading rights in that particular asset. No other exchange members (who had to right to trade on the floor in general) were allowed to execute transactions as response to orders directly that came into the exchange

and were required to had to hand over such transactions, even if they were the ones who received them, to the specialist. The specialist exclusive right to trade in the stock was in itself a substantial advantage over others who traded the same stocks because whenever a trader could not find a counterparty to a transaction, he/she would have to trade with the specialist and pay a fee (It has to be mentioned that the specialists did not only have to right to take part in trades but had an affirmative obligation to do so when transactions in 'their' stocks, to which there was no 'other side', were being conducted.). However, the specialists were also allowed to be brokers - to execute orders on behalf of the public. The combination of trading for one's own account and having access to a flow of orders from external sources gave the specialists unparalleled opportunities to make profits. For example, knowing the content of the general order book gave the specialists the ability to 'see in advance' future changes in the prices and take advantage of such events.

To the founders of CBOE the specialist model embodied all that was wrong with the well-established securities markets of the East Coast, and especially, the NYSE. The concept behind designated, monopolistic specialists was alien to the ethos that the CBOE founding team was promoting - that of a merit-based organisation where people were rewarded for their trading skills. Not only did a specialist-based system run contrary to the founding team's cultural preferences, they also questioned its moral soundness. Many of the traders believed that the specialist function gave the person holding it so much power that it was unavoidable that it would be abused. Referring to this tendency, a member of CBOE founding team said that specialists were not market makers, but 'thief-makers'.

CBOE's market makers

CBOE's alternative to the specialist system was the creation of a trading function that did not exist in securities markets at the time – market marker. The market makers were given the responsibility to supply liquidity in a specific options

contract, but, unlike the NYSE specialists, they were not given exclusive trading rights. In each pit there were several market makers, competing with each other for the orders coming from the public. The cumulative effect of the competitive system, it was hoped, would be that the public would be offered better prices than the ones supplied by the specialist system. Moreover, the market makers were not allowed to take advantage of their knowledge of the order book. Unlike the NYSE specialist who traded for their own account and also executed trades for others, market makers were not allowed to trade from their own account and take orders from the public at the same trading pit on the same day. A further requirement was that at least 50% of the volume of each market maker's daily transactions would be made in his or her designated options CBOE guide. The meaning of this rule is, for example, that market makers would not be able to 'find refuge' from unrewarding market conditions in their 'own' pit by spending most of the time in a different one, where they would be able to both trade for their accounts and take orders from the public (1975) p. 2123-6). An important implication of these two limitations was that the market makers, in order to make profits, were dependent completely on trading from their own accounts, risking their own funds.

Relying on the findings shown so far, one may be tempted to conclude that competitive market makers reflected aspects of the cultural heritage of the commodities markets and that the founders of the options market wanted simply to materialise the values in which they believed. In the same vein, one may say that CBOE was embedded in the culture of the commodities markets. Such an analysis would not be mistaken – social and cultural elements from the world of commodities trading did have substantial influence over the development of the options markets. However, the shaping of CBOE's market makers cannot be attributed completely to cultural influences. As the historical narrative shows, although the initial motivation for the creation of the competitive market makers did steam from the culture of the commodities markets, the particular organisational and political setting through which options markets developed also played a crucial role in the shaping of this liquidity-supply mechanism.

As described in detail in chapter 4, since the early 60s the SEC saw with growing

concern the manifestations of monopolistic practices within the securities exchanges. Cause for particular concern was the NYSE's institution of specialists, who had monopolistic privileges. The SEC's staff regarded the NYSE's specialists as a major obstacle to achieving free competition in the markets because the NYSE was the most influential financial marketplace in the US and as such its specialists held positions of extraordinary power not only in that exchange, but also in the American securities markets in general. For example, many of the stocks that were traded in other exchanges were usually traded in conjuncture with NYSE-traded stocks (e.g. buying NYSE-traded while simultaneously selling, say, AMEX-traded ones). This situation gave the NYSE specialists, who controlled much larger volumes of trading than in the other markets, the ability to affect prices of stocks across the American securities markets system.

It would be fair to state that the concentration of monopolistic rights that the NYSE's specialists had and its potential implications on fair competition among the regulated exchanges was a thorn in the SEC's staff's side and left them eager to find alternatives for this liquidity-supply mechanism. During the discussions in the late 60s between the founding team of CBOE and the SEC's staff the issue of supply of liquidity in the proposed market rose and members of the SEC's staff mentioned that the regulator would not like to see yet another system for the supply of liquidity that would be based on the NYSE's monopolistic model, and that mechanisms that would introduce competition to the market would be much more welcome. Milton Cohen, who headed the founding team realised that the issue of having a non-monopolistic liquidity-supply method was important to the SEC's staff and may help to move the options market proposal from the staff to the more senior part of the SEC – the Commission. Cohen, who was familiar with the commodities trading culture, saw this situation as an opportunity to use the affinity between the worldviews and interests of the regulator and the traders and progress the proposal. M* was a senior member of the SEC's department that held the discussions about the structure of the proposed market with CBOE's founding team:

Everybody knew that me and my colleges believed that competition was a better answer than regulation.[...]. Milton Cohen came up with a bright idea how to get this proposal moving out of the staff up to the Commission. He came in and said: 'we have an idea and that is to have a system of competing specialists'. And he knew what he was doing, he knew that if there was anything that the staff of the SEC was going to love, it was going to be that proposal.
(M* interview)

From the SEC's perspective, the proposal to base the liquidity of the new options exchange on competing specialists presented a great opportunity to show that there could exist an alternative to the monopolistic specialists' mechanism of the NYSE. From this perspective, a success of a market in which competitive market makers supplied the liquidity would have been a perfect counter-argument to the NYSE's long-standing claim that a market a competition-driven supply assurance mechanism would not be 'economically viable'. Therefore, the fact that the market maker concept was extremely useful for the SEC in promoting the agency's anti-monopolistic agenda served as a selling point for the new options market, to which (as described in chapter 4) some of the SEC high-ranking officers were objected bitterly.

The SEC approved competitive market makers as part of the structure of the new options market and thus, in effect, helped to materialise part of the culture of the commodities market in a new economic environment. The fact that competitive market makers came into being through an implicit cooperation, based on joint interests, between the exchange's founding team and the regulator can shed new light on the concept of culture in markets and indeed help to reveal the limitations of the embeddedness concept. As the findings show, actors in the markets were not only influenced and motivated by the culture in which their economic activity was embedded, but to a similar degree, they made use of elements of their culture in order to achieve political and organisational goals. That is not to say that the cultural heritage did not have a viable existence of its own and was fabricated merely to assist the regulatory approval of the exchange.

The findings presented in this chapter and in chapter 4 show that the different exchanges – the commodities ones and the securities – did develop distinguishable cultural traits and that these had influence over the shaping of market practices. As the story of the development of the market makers concept shows us, the actors played an active part in transforming elements of a trading culture into parts of the organisational structure of an evolving market. That is, embeddedness should not be seen as a characteristic of the market's structure, being brought about by actors who are captives of their own cultural heritage. Instead, as the case of the market makers shows, the embeddedness of markets in a particular cultural and social background is compatible with the capability of actors to operate 'outside' their cultural heritage and to be able to use it as means to an end.

The regulatory approval of the market makers did not signal the end of end of the influence of the commodities trading culture on the evolving market. One of the areas in which the influence was most noticeable was in the recruiting policy of CBOE. The well-established Chicago commodities markets, the CBOT and the Chicago Mercantile Exchange (CME) took pride in promoting an ethos of being meritocratic, non-discriminatory, 'opportunity-giving' exchanges (Tamarkin 1993). Both institutions declared that they took on as traders people from the lower ranks of society and gave those people a chance to move up the social ladder by becoming traders (It must be noted that the declared ideological concept should be assessed on the backdrop of evidence showing that many in the agricultural commodity exchanges acquired trading positions through family connections. The high proportion of traders' relatives who became traders themselves somewhat weakens the manifestly expressed open-for-all meritocracy culture). CBOT's strong organisational value to encourage and promote individual traders was among the factors that motivated the creation of the market makers concept. However, the organisational set of practices that underlined competitive market makers also created considerable challenge for the young exchange.

The events analysed in the chapter 4 show that in many respects CBOE was a hybrid between the two, until then separate, worlds of commodities markets and

securities markets. This unique constellation combined with the fact that CBOE was a new exchange made it difficult for the market's founders to recruit new members. As chapter 4 shows, the commodities trading community was framed by a strong structural factor – the need to find products that would induce large volumes of trading. This factor can help to understand the relations that commodities traders had with the developing options market. Large parts of the commodities community showed interest in the new market when the commodities markets were slow. However, in late 1973 the agricultural commodities markets showed signs of recovery and trading volumes started to grow significantly. Consequently, the interest expressed by commodities traders in options markets diminished (Markham 1987). In addition, in spite of the motivation to seek profits and to expand to new markets, commodities traders were not in haste to swap a vocation they were familiar with, indeed one that had sometimes been practised for in their families generations, for a new type of market. For example, commodities trading was based on numerous sets of practices that the traders needed to master and perform perfectly. Those were the basis for a success in commodities markets. The impact of those practices – the practical aspect of the commodities trading culture that, as chapter 6 describes, the development of trading techniques in the early days of CBOE were virtually copied from the different environment of commodities trading. Not only the local trading community hesitated to commit resources to options trading, the big brokerage firms were not quick to jump on the organised option-trading wagon either. Those firms, most of which were based in the American East Coast, were reluctant to buy seats in the new exchange, relocate employees to Chicago or hire local staff, thereby effectively opened branches in Chicago, and practically have dedicated representatives on the options trading floor. Instead, most of those securities-trading firms used local CBOE clearing firms as their brokers. The combined outcome of those two factors was that in its first year, the CBOE founding team encountered difficulties in selling seats for the new exchange. K*, who took part in the development of CBOE, describes:

> It was a hard sell. They really put the muscle to buy a seat.
>
> (K* interview)

Some CBOT traders bought seat for their younger relatives as kind of a hedged investment – if the options market would not prosper, the son or daughter would always be able to come back and trade in the CBOT. On the other hand, if options were to prove to be a success, then the family would have a stake in that from early on (U* interviewed by MacKenzie). Also, the relatively cheap seat prices ($ 10,000 for a CBOE seat, in comparison to $50,000 for CBOT one, for example – K* interview) tended to attract people for whom CBOE would be their floor trading experience. In addition, while not many 'outsiders' bought CBOE seats in its early days, many of those who did enter the market were people who were, in some form or another, part of the CBOT social network. For example, a large proportion of the traders who joined the CBOE in its early days were sons and daughters of CBOT members:

> [T]here was quite a few sons of traders that were starting their first job. Like a guy that his father was a corn trader and saw the concepts and saw that he could get the son there fairly cheap, could get him a job coming out of college or even a runner coming out of high school. There was quite a few of those.
>
> (K* interview)

Being a new player among the more established Chicago markets, it was hard for the CBOE to attract new members. As mentioned earlier even at the relatively cheap price of $10,000 for membership fees it was still 'a hard sale' to recruit new members to CBOE - this was a sum of money that many of the prospective recruits found hard to come by. This difficulty motivated the founders of the exchange, who also expected to take part in the trading, and others who believed in the idea of an organised options market, to help those who were interested in becoming members in the new exchange to by giving them generous loans to pay the initial membership fee. As seen in the example above, and true to the community spirit of the commodities markets, frequently such loans were agreed upon only by a handshake.

The communal background of the commodities markets and, in particular, the financial support that veteran traders gave to newcomers contributed to the creation of a situation in which the new options market began to operate with a

population of traders who were relatively strapped for cash. Many of those who bought seats in the first year of CBOE's trading were assisted by relatives or friends in order to do so. Namely, by the time that the new traders paid their fees, and actually started trading they usually had little initial capital with which to trade. Awareness to the Chicago meritocracy-based recruiting policy and its implications on the options traders' demographic profile was not limited to the Chicago trading community. In the Securities and Exchange Commission (SEC), the regulating body that was in charge of securities-related contracts trading, with which CBOE's founding team were negotiating during the market's early years, it was widely known that CBOE's market makers had typically lesser financial resources than specialists in other exchanges. V*, who was a senior employee of the SEC's division of market regulation and participated in the approval of CBOE said that the common notion among the staff of the SEC about CBOE market makers was that:

> If they [CBOE] were going to run the floor with 'taxi cab drivers and hair dressers' they would have to find a way to get these people financed.

(V* interview)

This fact bore potential problems for the new market because the traders were the group from which market makers were to be recruited. Competitive market makers were expected to supply liquidity by risking their own funds and, unlike the specialists in securities exchanges, did not have the prerogative of having monopolistic rights over their trading. In order to perform that task market makers needed to maintain relatively large sums of 'working capital'. Thus, the fact that many of the market makers had little capital with which to trade created a problem not only for the individual market makers, but had implications CBOE as a viable market.

The profile of the typical options trader in early CBOE was also related to another aspect of market liquidity – the exchange's response time. The ability of the market makers to buy and sell at the required prices would be rendered useless, or sometimes even harmful, if the orders would not be fulfilled in a timely manner. For example, options may be purchased to protect against the

adverse implications of stock prices rising above a certain value. That is, purchasing options when the stocks are above that value would defeat that purpose. For this reason, the efficacy of the market making mechanism, and to a large degree, the viability of the options exchange in general, were dependent on market makers performing their function when it was needed. In addition, the response rate becomes even more crucial at times of high volatility, when prices of both the underlying stocks and the options change violently. However, such situations, when a receptive supply mechanism is needed critically, are also the times in which the obligations that market makers need to undertake would imply the greatest risks. Consequently, it was feared at the CBOE that some of the market makers who were struggling with funding issues would face difficulties to supply liquidity in times of high volatility, and thus may hurt the efforts of the exchange to establish a positive reputation for itself as a reliable and a receptive market. (K* interview). The exchange's reputation and its relation to liquidity reveals another layer in the complex social and organisational environment in which market makers operated. The supply of liquidity was surrounded by a self-fulfilling process: a belief among the investing public that an exchange is liquid would tend to generate stream of orders to that exchange and thereby making that market liquid. Similarly, a negative reputation about the liquidity in the exchange may bring about a less liquid market. This social loop added another arena in which the market makers needed to perform – the arena in which the reputation of the exchange was determined.

With regard to the reputation issue the climate of opinion into which the new exchange was born was particularly difficult. Two years before the CBOE was opened, in spring 1971, the National Association of Securities Dealers (NASD) had opened its computer-based exchange – NASDAQ (AQ stand for Auto-Quote) (Seligman 1985). Early NASDAQ quickly got the reputation of not being a very receptive market, a market where 'they don't answer the phone' when one was calling to place an order (K* interview) or where one had to wait a relatively long time for a quote, let alone an execution of a transaction. As shown above, CBOE's unique system for the supply of liquidity, the market makers' system was backed by traders' who bought and sold from their own accounts. Therefore, in order to create and maintain a reputation as a responsive market, the staff and

members of the CBOE wanted to ensure that the market makers would have the ability to supply continuous liquidity to the market.

As shown in the previous section, the creation of competitive market makers, combined with the fact that the CBOE was a new and in many ways an innovative market, contributed to the fact that in the early years for their operation, the CBOE's market makers had very little available funds with which to trade. Since market makers were the ones who supplied CBOE with the all-important liquidity, it was critically important for the exchange that the operation of its market makers would be as smooth and as trouble-free as possible. Nevertheless, as the shown so far, the embeddedness of CBOE in the Chicago commodities markets' culture created significant difficulties for the market mechanism that was influenced by the same cultural heritage – the competitive market makers. The options market makers were given the responsibility to supply liquidity to the market while not having been granted the monopolistic privileges that specialists in securities exchanges had. This fact put the market makers under significant economic pressure, a result of the need to risk their own funds when taking part in transactions. The exchange-wide implications of those financial pressures at the individual level were exacerbated by the fact that, being a new exchange, CBOE had difficulties to recruitment new members. The combination of these two factors brought about a situation in which liquidity in early CBOE, and indeed the market's survival were dependent on market makers who had little working capital.

'Short selling' and the extension of credit to market makers

In order to understand the particular problems that market makers in early CBOE faced, it is needed to discuss the practice of this market function in further detail. CBOE's market makers, due to their expected market function of supplying liquidity, typically needed to make very frequent trades so that the variable

demand/supply trends in the market would be met. From the market makers' perspective, the purpose of such trading mode was to try to make profits from small, short-term price changes. However, in order to make substantial profits from the relatively minute and short-timed prices changes, market makers had to buy and sell large quantities of options contracts. For example, if an option contract's price dropped by an eighth of a dollar and was selling for $10, and a market maker believed that the price should soon return to its previous level, he/she would have to buy 1000 options and pay $10,000 in order to make possibly $125 in profits. It is true that when trading in that manner market makers risked their capital for relatively short periods. Although short, there still existed times in which market makers' capital was involved in a trade, and therefore exposed to risk. Since market makers were trading from their own accounts, they tried to minimise such risks. Having had to risk such large amounts of capital many times during each trading day market makers, who already had to pay membership fees to be able to trade in the exchange and had to compete with each other, were pushed to the limits of their financial abilities. Those factors motivated the market makers, and CBOE, which was dependent on their operation, to find ways to 'finance the trading floor' – to find sources of credit for the operation of the market makers.

One of the trading practices that helped the cash-strapped market makers in early CBOE to perform their market making function without having to risk considerable amounts of capital was known as short selling. The short selling practice was based on borrowing an asset, selling it, then buying it back and returning it to the lender. To be able to borrow stocks the market makers needed to achieve a credit-worthy status good enough so that the big brokerage firms, which had large reservoirs of stocks and performed such borrowings, would be willing to lend them assets. For example, a market maker could borrow the stock, sell it and then, after buying the same stock for a lower price, return the borrowed stock to the lender, thereby making a profit from the difference between the prices. Although the market makers paid for the use of the borrowed assets, the borrowing action itself was based on an extension of credit. However, for the typical early CBOE market maker, with his/her limited personal funds, receiving permission to borrow stocks from any big securities brokerage firm

was a very difficult task to accomplish (C* interview).

A possible solution for the market markers' plight that could help them to finance trading practices such as short sales was to demonstrate that the function they filled in the options market – the supply of liquidity – made them eligible for special extensions of credit under the Federal Reserve Board (FRB) credit extension rules. This set of rules commonly known as regulation T (US Congress 2002). Regulation T was designed to govern the extension of credit[40] to, among others, securities specialists. The regulation included definitions of situations ('provisions') in which special extensions of credit were permitted. The special extensions of credit provided relatively comfortable conditions for the performance of loans. Such a guarantee would allow options market makers to be able to borrow stocks under more favourable conditions than they would have otherwise (e.g. lower collateral would be required, longer periods for return of the loan would be allowed). Those provisions were meant to help specialists to perform their market making function. CBOE needed to show that its market makers performed a similar task in options markets and therefore were entitled to same regulatory privileges. As seen earlier, CBOE's market makers symbolised a conceptual break form the traditional specialist role. CBOE's market makers did not enjoy the monopolistic status of the securities specialists and competed among themselves for the transactions. This conceptual innovation was a source for uneasiness among the regulating bodies. For example, the fact that CBOE market makers were not given exclusive rights over certain options raised the concern that they would be put under difficult tensions between their market making duties and their individual trading interests. As seen in the chapter 4, the trading of options based on securities within the framework of an organised exchange was a radically innovative step.

CBOE's founding team, and later on CBOE's staff continuously tried to bring about changes in some of the definitions according to which credit was extended so that options market markets would also be entitled for credit. Milton Cohen

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[40] 'Credit' in this legal context means that specialist were entitled to be given short-term, interest-free loans.

and C*, the lawyers who led the CBOE's founding team's legal efforts, suggested that a possible way to help market makers to finance their trading would be by bringing about a change in regulation T itself or in the way the regulation was usually interpreted by the Federal Reserve Board. C* and Cohen's idea was to persuade the Federal Reserve Board that options market makers, having an important function in a national securities markets, should also benefit from the 'specialist credit provisions' – thus allowing some of the market makers' trading practices to be financed with privileged credit. Originally, regulation T was designed to govern the amount of credit that to be allocated by any members of securities exchanges to investors for the purchase of securities. CBOE's legal team argument was aimed to persuade the Federal Reserve Board to extend the interpretation of the specialist credit provisions of Regulation T so that they could be applied to CBOE' market makers' transactions as well.

The possibility that CBOE's market makers would need to resort to the provisions of regulation T in order to finance their trades was anticipated before the exchange was opened. As discussed in detail in chapter 4, during the time in which the CBOE proposal was going through the various stages of regulatory scrutiny by the SEC and the Federal Reserve Board, the general regulatory attitude toward options that prevailed was mostly negative. The attitude was not limited to the SEC, but was also reflected among other regulatory bodies. The general notion that the organised trading of options was not a desirable development was given different interpretations according to the particular area for which each of the regulators was responsible. For example, C* mentioned that when entering a meeting with Janet Hart, then an assistant director of the Federal Reserve Board's Savers and Consumers affairs department,[41] he found that:

> [...]she had spread out on the desk a Wall Street Journal article on CBOE's start up and I could see, as I sat there, that some places were underlined in red and I looked at it and everywhere that was underlined was the word 'gambling'.

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41 Hart was appointed in 1976 as director of the Federal Reserve Board's Division of Consumer Affairs.

C* interview)

In the meeting C* wished to persuade Hart to support the extension of regulation T to CBOE's market makers. The comparison between activities in financial markets and gambling indicate how was the resentment to options that existed among the staff of the FRB. Gambling was a practice from which all American financial regulators tried to distance. A potential attachment to activities that may resemble gambling was fought fiercely, as shown in more detail in chapter 7. Therefore, it was obvious that in such an environment a relaxation of the credit rules was very unlikely to occur. In addition, unlike the SEC, in which the views about options changed as the new competitive field of options trading evolved, the Federal Reserve Board's resistance to changes, which existed before CBOE was opened, remained intact after the exchange started operating and organised option trading proved a success. In the first years of options trading, although it softened its positions to some degree, the Federal Reserve Board was still very much reluctant to allow an expansion or alteration of regulation T so that options market makers would be able to use the more favourable credit rules.

CBOE's founding team, and later on CBOE's staff continuously tried to bring about changes in some of the definitions according to which credit was extended so that options market markets would also be entitled for credit. Milton Cohen and C*, the lawyers who lead the CBOE's founding team's legal efforts, suggested that a possible way to help market makers to finance their trading would be by bringing about a change in regulation T itself or in the way the regulation was usually interpreted by the Federal Reserve Board. C* and Cohen's idea was to persuade the Federal Reserve Board that options market makers, having an important function in a national securities markets, should also benefit from the 'specialist credit provisions' – thus allowing some of the market makers' trading practices to be financed with privileged credit. Originally, regulation T was designed to govern the amount of credit that to be allocated by any members of securities exchanges to investors for the purchase of securities. CBOE's legal team argument was aimed to persuade the Federal Reserve Board to extend the interpretation of Regulation T so that it could be applied to CBOE' market makers' transactions as well.

The situation in the regulatory sphere was reflected to a large degree in the options exchange itself. The popularity of securities options grew immensely in the first few years after CBOE. However, the fact that CBOE had become a successful exchange did not alleviate the market makers' financing problems. During the first 3 years of CBOE's operation, the task of supplying liquidity to the market became increasingly more challenging and consequently, the importance of market makers who would perform efficiently rose. In particular, as more options were added to the market and trading became more diversified, maintaining liquidity in every variety of the contracts became increasingly harder. Each stock that was added to CBOE's options list meant an addition of a few dozens of options (i.e. different expiry dates and different strike prices). For example, although a popular stock like General Motors was traded in high volumes every day and were therefore liquid, for each stock there existed many different options series, with different expiry dates and different strike prices, and therefore it was likely that some of the options written on the basis of the stock were traded much less frequently, did not necessarily have ready buyers and sellers at any given moment and, as a result, did not have a reliable market price. Hence, in order to receive a price quotation for such an option or to execute a transaction, an intervention by a market maker was needed. Additionally, unlike securities whose trading volumes usually did not fluctuate widely, options volumes tended to grow significantly as their expiry times approached. As a result, many options contracts tended to be traded in low volumes during much of the contracts' life, thus making the market for them highly illiquid, thus calling for frequent intervention by market makers. Another factor that was influenced by CBOE's growing popularity was its membership prices, which were pushed upwards. This factor, in turn worsened the market maker situation because the higher prices made new recruits even more cash-strapped when they actually started trading than previously. These factors contributed to the fact that market making in CBOE became a financially risky endeavour. For example, an indication to the growing difficulties of being a profit making market maker in the early years of CBOE is the fact that in the first decade to CBOE's existence annual bankruptcy rate among market makers stood at about 10% (U*, interviewed by MacKenzie).

The above-mentioned factors enhanced the necessity in finding a regulatory solution for the market makers' funding problem and fuelled the motivation of CBOE's staff to find alternative arguments for changing market makers' regulatory status. In spring 1975, two years after the opening of the exchange, the CBOE's senior staff learned that Janet Hart, the Federal Reserve Board' assistant director who was responsible for the maintenance of regulation T was replaced by a new assistant director – Robert Plotkin. Plotkin, who had been a former SEC staff member, was regarded as a more 'receptive' person to new ideas than his former colleague (C* interview). In fact, the CBOE's founding group learned about the new appointment during one of their meetings with SEC's staff members when it was recommended to the exchange to approach Plotkin (M* interview). Similar to the events analysed in the previous chapter, this is another evidence for the regulatory strategy that the SEC was implementing in options markets. The SEC's staff was aware of the funding problems that the competitive market markets were facing and knew that the existence of CBOE as an actor in the competitive field was dependent on the effective function of the market makers. Therefore, the SEC's staff believed that the expansion of the provisions of regulation T to market makers would help to maintain options markets as a competitive field. Following that recent change in personnel, CBOE's legal team focused its efforts once again on regulation T and tried to bring about a change in the legal interpretation given to the regulation's content so that certain transactions done commonly by market makers would also be eligible for credit.

The problematic distinction between hedging and speculation

Since regulation T governed credit extensions for the purchase of securities, CBOE's chosen argument for changing the regulation was that certain practices which involved the purchase of securities were an essential part of the market maker's function, to supply liquidity to the markets. Therefore, those actions should be funded using regulation T's credit. The practice to which that CBOE's

argument was specifically referring was called 'hedging' – buying or selling of securities as insurance against price movements that would have an adverse effect on the options position. For example, a market maker who sold call options could limit the risk of holding such positions by buying the stocks for which the options were written. By so doing, if the options were to be exercised, the market maker would already have the stocks to be sold to the options buyer. CBOE's staff argued that buying stocks in advance (hedging) was an important part of the conduct of the exchange's market makers. According to the argument, by covering their potential options' obligations the market makers would be under less financial stress and would be able to perform better. The aggregate effect of this improved performance, the argument continues, would be that the exchange as a whole to be more receptive to the investing public orders and generally would maintain better liquidity. The application of regulation T to transaction done by options market makers would imply that they would be able to buy securities using credit permitted by the Federal Reserve Board, thereby allowing them maintain lower amounts of working capital than they would have otherwise.

As the description above shows, the application of regulation T was meant to assist market participants whose function was important for the functioning and the viability of the market as a whole. Arguably, hedging performed by market makers was such activity. However, the purchase of securities could be done for a number of reasons other than hedging. Most obviously, an options market maker could be buying securities with a speculative intent of making profit. Such a transaction would not be supported under the definitions of the provisions of regulation T. This situation turned the distinction between the two to a problematic one. Both actions – buying securities as part of hedging action and buying them as a speculative act – were practically identical, the only difference between the two being the intentions behind the two actions. However, only one of the two – hedging – could conceivably be covered under regulation T's provisions. Consequently, an argument that was supporting the application of regulation T's provisions to options market makers, like the argument that CBOE's staff was promoting, needed to present a way to distinguish between the hedging-related and speculative securities transactions.

In order to understand the difficulties in the creation of rule for the distinction between hedging and speculating, a closer look into the practicalities of options trading is needed. First, the ratio between stocks and options that covers all of the possible obligations is too limiting as a category for distinction. Let us assume that a market maker bought stocks and sold call options. It could be argued that the number of shares that would cover exactly all of the market maker's potential future obligations is a genuine attempt to hedge risks, according to regulation T. However, according to the same logic any number of stocks above or below that number might be considered a speculative attempt, either through the use of the stocks or through the use of the options. In order to maintain this ratio market makers would have to sell or buy stocks each time they buy or sell options, an impossible task to perform in the dynamic environment of options trading. Second, the fact that a number of stocks were bought would not necessarily help in determining whether that part of the options and stocks position should be considered a hedge or not. Options, being high-leverage instruments, usually cost much less than the stocks for which they are written, especially when they were 'out of the money'.[42] Moreover, each options contract was written for 100 stocks, so that many (relatively expansive) stocks would be needed to cover fully each options position. As a result, market makers could not possibly be expected to protect all their possible options obligations by buying the full amount of stocks mentioned in the options contracts. Following such a practice would render it nearly impossible for them to make a profit from the operating as market makers.

The practices of professional options trading added layer of complexity to the possibility of making a distinction between hedging and speculation. To increase the potential of making profits from minute market movements market makers usually sold not just one series of options contracts, but several ones with different strike prices at the same time.[43] For example, a market maker may sell call options on IBM's stock with the same expiration date but with strike prices

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[42] An options contract is 'out of the money' when the market price for the stock on which the options is written is traded is lower than the price indicated on the option (call option) strike price or higher than that price (put option). During such times it would not be profitable to exercise the option and therefore its price would be relatively low.
[43] See definition in glossary

of $120, $125, $130 and $135. If IBM's current market price is $85 then there is a higher chance that the price would reach $120, and thus make the $120 options exercisable, than the chance for the $130 or the $135 options to become exercisable. Consequently, from a hypothetical perspective, one might expect a market maker to own enough IBM stocks that would cover the $120 strike price options, but it would be less reasonable to expect the market maker to have bought enough stocks so as to cover the whole range of options up to the $135 ones. In any case, like in the previous example, the decision about the level of protection could seem to be dependent on the market maker's subjective risk preferences.

The combination of these facts contributed to the creation of a practice according to which market makers did not fully cover their options obligation, but instead maintained a 'risk ratio' – buying stocks that covered only part of their possible future obligations. The 'risk ratio' practice reconfigured the problematic distinction between hedging and speculating (K* interview, F* interview). Since the market makers did not buy and hold stocks that covered all of their possible obligations then the difference between hedging and speculation turned binary one – a market maker was either hedging or speculating – into a continuum. The ratio between the options part of the position and stock part reflected more the individual market maker's level of risk aversion (or risk acceptance) and was less indicative of the intentions behind the market makers' actions. The practices of options trading – the continuous 'risk ratio' – in effect separated the distinction problem from the realm of intentions and placed in an even more difficult area from a regulatory perspective – the personalities of the market participants. Namely, the application of regulation T would be determined according to the level of risks that different market makers were willing to endure. This reconfiguration of the distinction problem also shows clearly the moral roots of the financial regulation. Regulation T was designed to regulate capital in financial markets, but in the early days of CBOE, the application of this regulation would have amounted to passing a judgment about the character of market participants: who is responsible enough to trade and who is too reckless to do so.

The factors mentioned in the paragraphs above – the fact that options were a high-leverage instrument and the simultaneous use of options with different strike prices – turned to integral elements of CBOE's trading practices and in particular, the way the most active traders in it, the market makers, operated. Thus, as the institutionalisation of market making progressed, the ability to define rules according to which hedging would be distinguished from speculation became increasingly harder. In addition, as CBOE became a successful exchange, with high volume of transactions and common use of complex stocks and options combinations the market makers' financing issue became a more pressing problem for the exchange. As seen earlier in this chapter, the existing definitions of eligibility for credit according to regulation T were not suitable for the particular demands of the organised option-trading exchange. The complexity of options positions turned the judicial definitions, which before organised options trading provided clear-cut distinctions, to virtually impractical. As a result, using regulation T to decide which transactions should be funded in the options exchange would inevitably include a judgment of the individual trader's level of risk acceptance/aversion. Regardless of moral and political issues that such a practice would have probably arise, the use of such a time consuming judicial procedure in the hectic environment of the options market makers would have in effect brought the market to a standstill.

Creating moral distinctions through mathematics: The Black-Scholes model and regulation T

The development of the complex organisational and technical environment in which options were traded put obstacles for the implementation of regulation T for option market makers. Yet, other elements of the same sociotechnical environment were used to offer a solution to the funding problem. The elements of the exchange's structure that were most relevant to the development of the distinction method were the options clearinghouse and the clearing firms. Chapter 6 discusses the options clearinghouse in more detail; at this point it is necessary to indicate several aspects of the relations between the clearinghouse and market makers. A clearinghouse that bought from the sellers and sold to the buyers mediated transactions in CBOE. The clearinghouse thus guaranteed the fulfilment of the contractual obligations and completion of the transactions. Members of the clearinghouse paid high fees for the clearing services and had to deposit a capital value of at least $250,000 (1975) at the clearinghouse (K* interview). These conditions prohibited virtually all of the market makers in early CBOE from becoming members of the options clearinghouse. Instead, more well established members of the exchange, who were members of the clearinghouse set up what became to be known as 'clearing firms', firms that mediated between the clearinghouse and the smaller trading outfits, like the competitive market makers. The clearing firms managed the market makers' accounts with clearinghouse, while using their capital deposit with the clearinghouse as a guarantee. Practically, this meant that clearing firms were responsible to deliver to the clearinghouse money and options contracts in accordance with the obligations of their customers, the market makers. The clearinghouse would then transfer those assets to counter parties to the transactions. Clearing firms were thus exposed to considerable financial risk: in order to fulfil their obligations to the clearinghouse they had to assure that the customers they represented, the market makers, had enough un-indebted liquid assets in their accounts. As shown earlier, portfolios of market makers would typically consist of several hundred

options positions of different strike prices, expiration dates and transaction status ('short' or 'long' – representing either obligations or credits, respectively). Because of the size and complexity of the market makers' portfolios, the task of appraising how many liquid assets they contained was a burdensome one.

To asses the risks involved in their market markets' positions, several of the clearing firms developed computer programs based on the Black-Scholes options pricing model. The application of the Black-Scholes model in early options markets is discussed further in chapter 6. Therefore, without delving too deeply into the theoretical background of the Black-Scholes model, a few points about it are discussed briefly here. The mathematical pricing model was developed by Fischer Black and Myron Scholes and is commonly known as the Black-Scholes model (Black and Scholes 1973a; Black and Scholes 1973b). Using the model, one could predict options contracts' prices. Alternatively, knowing the present price of a contract, one could use the formula to evaluate how risky a certain options position was. According to the theory behind the model, the risk free portfolio would only earn a rate of return equal to the one paid by a risk free interest bearing deposit account. When the price of the option is known then the Black-Scholes formula can be used to calculate a ratio between the amounts of the number of stocks and number of options contracts that would compose a risk-free portfolio. The Black-Scholes model was based on an assumption ('the no-arbitrage' hypothesis) according to which the cash flow generated by a risk-free portfolio would be identical to the one generated by an interest bearing account. By equating the option-security portfolio to the interest bearing account, the option's theoretical price was discovered. From the same equation, the ratio between the amounts of security and amount of option could be derived. By applying the Black-Scholes formula to the market makers' accounts, clearing firms were able to assess how 'far' were the market makers' positions from the formula-produced risk-free ratios, or in other words, assess how risky were the market makers' positions. The measurement was used as an approximation of the liquid assets that each of the market makers held.

One of the CBOE clearing firms that were at the forefront of using Black-Scholes-based applications in options trading was Timber Hill. In late 1974 a

CBOE staff member saw Timber Hill's risk assessment system in operation and realised that the method could potentially be used for solving the distinction problem between hedging and speculation and thus to supply the struggling market makers with credit provided through the application of regulation T. The staff member's idea was that the same result produced by the Black-Scholes formula and that indicated how risky a market maker's positions were would also indicate if that market maker was hedging his/her options or speculating (K* interview). The principle on which the distinction method was based was taken from the Black-Scholes theory. According to the theory, a portfolio that maintains a risk free ratio between the stocks and the options composing it could only earn the minimal rate available in the market (i.e. the risk-free interest rate). Therefore, if the calculation by the Black-Scholes model showed that a market maker's portfolio maintained such a risk free stocks-options ratio (or close to it) then it would be safe to assume that the owner of that portfolio had no speculative intentions. Having no intentions to use his/her privileged position to speculate and make profits, the argument continues, that market maker should be entitled to credit according to the provisions of regulation T.

The idea was presented to a joint committee of CBOE's staff and members, which decided to allocate more funds to study it. The committee's decision was to devote resources to develop the idea into plan, which would then be presented to the Federal Reserve Board, in an effort to bring about a change in the interpretation of the regulation. As mentioned in the chapter 4, the staff and the members frequently disagreed on matters relating to the development of the exchange, especially when the allocation of funds was involved.[44] Therefore, the fact that the staff and the members of the exchange both agreed on this mode of operation shows that there that was widely accepted that the market makers' financing problem, if not solved quickly, would have potentially grave implications for the exchange. During the following months, various departments in CBOE's staff developed the regulatory and technical aspects of the model-based distinction method and tried to adapt it for the exchange's needs. In November 1976 Joseph Sullivan, by then CBOE's president, sent a letter to

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[44] Abolafia (1996) described similar relations between the staff and the members of the NYSE.

Robert Plotkin of the Federal Reserve Board in which he explained the proposed method:

> [According to the proposal] [T]he Board [the Federal Reserve Board] would either issue an interpretation of, or adapt an amendment, to the specialist account provisions of regulations T and [let us] know that credit may be extended to options specialists and market makers with specialist accounts with respect to certain exercise and hedging transactions in the underlying securities. [...] [An] alternative definition [to the bona fide distinguishing rule] that we believe merits consideration is the one which would incorporate an options pricing model formula by reference. Under a formula of this type it is possible to estimate the rate of change in the price of an option with respect to small changes in price in the underlying stock. The estimate of the amount by which an option price would change upon a change of $1 in the stock price is commonly called the 'dollar delta' and, thus, determines the amount of stock that would theoretically hedge a total option positions against small changes in the price of the stock.

(Letter, Sullivan to Plotkin, November 19, 1976)[45]

The idea presented in the letter from which the quote is taken is a developed version of the general argument presented above. The proposed method claimed that by maintaining the 'dollar delta' ratio a risk free position would be created. This argument, in turn, is based on the risk-free assumption that underlines the theory of the Black-Scholes model. Following the theory behind the model would lead to the implicit argument according to which risk-neutral positions could not possibly be a speculative position, and therefore, by default, had to be bona fide hedging positions. However, in spite of the fact that the jurisdictional context in which the letter is positioned (i.e. the regulation to which references are made) that lead to such implicit deductive conclusion, the letter leaves this

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[45] All the quotes from the November 19, 1976 letter are taken from a letter sent by Joseph Sullivan, President, CBOE to Robert Plotkin, Assistant Director, Division of Savers and Consumers Affairs, Federal Reserve Board, November 19, 1976 (Federal Reserve Board's library archive, microfiche section, filed under 'Banking Supervision and Regulation')

point implicit and does not stress it. This may lead to the question: why would the president of the options exchange, who was aware of the market makers' financing problem, mention only implicitly the strongest evidence that could support his argument to the regulator – the scientific theory on which the method was based?

The answer to this question reveals an important characteristic of the developing options market environment, a characteristic that played an important role in the story of the incorporation of options pricing models into the socio-technical infrastructure of the markets. Although the Black-Scholes model gained a respectable status in the academic world and was considered by many to be not only the most successful piece of research in financial economics but in economics in general, the incorporation of application based on the model did not rely on its scientific reputation. Instead, market participants, both from the exchanges' and the regulators' sides built their arguments, which supported the inclusion of models into the markets, on the fact that several areas of the markets had already been using model-based techniques and that these worked well and therefore should be expanded. Put differently, market participants replaced the scientific accuracy and validity of the model with 'practical validity' credibility that derived from the use of model-based practices in the market. The fact that market participants persistently used market practices in their arguments may not seem surprising at first, after all, the markets was the arena they knew best. However, this fact sheds light on the creation of socio-technical environments. That is, the Black-Scholes model was incorporated into options markets, and consequently became modern economics' most successful piece of theory, not because market participants necessarily believed in the accuracy and validity of the model but because practices based on the model helped to solve organisational and regulatory problems faced by the developing options exchange.

This trend, the use of market practices as in the argument supporting the inclusion of model-based methods, is also apparent in this case. Hence, in spite of the fact that Sullivan's letter quoted above did suggest that the Federal Reserve Board used the Black-Scholes model as a basis for a distinction between

risky positions (speculations) and less risky ones (hedged positions), this suggestion was not backed by the claim that the Black-Scholes model was a scientifically-proven risk evaluation method. In this case, the fact that the scientific background of the model was not mentioned can be attributed to other reasons as well. In 1976, only 3 years after the Black-Scholes model was first published, no one, including the model's developers, had undoubted knowledge about its validity and accuracy. Therefore, a suggestion to base a Federal regulation on a yet an unproven scientific theory might have encountered questions about the theory's accuracy and reliability. For example, Dan Galai, who was Scholes' PhD student, showed that in the early months for the operation CBOE, options prices that were calculated by the Black-Scholes model diverged substantially from actual market prices (Galai 1977; Galai 1978). Instead, as mentioned before, the CBOE's argument for the model-based technique did not refer to the model and its mathematical properties but instead to the fact that it had already been incorporated into the trading activity:

> [...] The principle advantage of the dollar delta formula is that it provided good mathematical test of a bona fide hedge. Although the formula is a complex one, it could be programmed without undue difficulty and [...] it can produce printouts that would be relatively small and thus easy to understand and to review.[...] Number of clearing firms have already developed and are using computer programs incorporating the dollar delta concept in order to supervise the hedges of the specialists for whom they clear.

(Letter, Sullivan to Plotkin, November 19, 1976)[46]

This quote presents two arguments for the use of the Black-Scholes pricing model. First, it is argued that the results produced by the model are numerical and therefore would be clear and easy to understand. Second, it is claimed that the method would be relatively easily to implement because a number of CBOE firms (e.g. Timber Hill) had already been using the method to assess the risk

[46] Source is same as above.

level of their market makers' positions.[47] The second argument, which is based on the market's 'practical validity', also provides information about the overall historical narrative of the development of options markets socio-technical environment. In the letter, Sullivan argued that a Black-Scholes-based system would be a preferred alternative to the existing regulation T determination method because such systems were already in use by CBOE market makers. In other words, in 1976 Black-Scholes had already become an integral part of the organisational and technical mode of operation of several of CBOE's leading clearing firms. The letter mentions the fact that member firms have been using Black-Scholes-based systems successfully for the critical task of assessing their market makers' risk levels and this fact is used add credibility to the model. The implicit conclusion of that message in this context was that if the Black-Scholes model was sufficient for risk assessment in CBOE, it should be good enough for regulatory purposes as well.

As the historical narrative analysed in the chapter 4 and in this chapter shows, the creation of legitimacy for the use of the Black-Scholes model in market environment was one example of a broader social process through which market practices were created and institutionalised. Generally speaking, the creation of the options exchange was not simply a result of an application of a formulated concept to a new product, but rather a continuous reshaping process of social and cultural constructs, a process in which the staff of the exchanges, their members and the regulators took equally important parts. In the case described in this chapter the CBOE's market maker concept did not develop only as a mechanism for the supply of liquidity; it also represented ideas and beliefs that were held strongly by the Chicago trading community. Consequently, the fact that several of CBOE's clearing firms chose to use the Black-Scholes model was not merely an adoption of the technology. In the unique social and organisational context that developed in CBOE, the fact that leading clearing firms chose to use the model granted the model enormous amount of legitimacy among other market

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[47] This argument is related to the implicit assumption that assessments produced by mathematical formulae are fundamentally different from other types of assessments (e.g. written or verbal arguments). This matter it is discussed in detail in the discussion part of the thesis, after several similar cases are presented.

participants. In other words, the important process from a historical point of view was not that some market participants used the model, but the fact that model-based applications and practices gained practical credibility and validity, and through this process the options market environment was shaped: the socio-technical infrastructure of he market and the regulatory framework that developed beside it.

Accordingly, the case in this chapter adds more evidence that support the argument that the options market was a hybrid social institution. More specifically, the case shows that during the development of the new market environment model-based practices did not simply replace the ones that were based on traditional commodities markets culture. Instead, elements of the trading culture were given new technological interpretation, an interpretation that maintained their strength and relevance to the new market environment. As discussed in the previous chapter, a strong sense of individualism and reliance on one's skills, courage and 'trading senses' were among the hallmarks of the Chicago trading community. These elements of the market culture were not abandoned when the Black-Scholes model appeared on the floors. As the chapter 6 shows in more detail, CBOE's infrastructure was developed in such a way that even in the presence of mathematical models the traders were still the ones who analysed the market picture and remained the one who made quick and sometimes fateful decisions whether to buy, sell or hold. Mathematical models were only aiding that decision-making process by giving additional indications to market situations or by adding assessments. Equally, even though as model-based practices became more central on the trading floors, traders knew that to gain a reputation as skilled traders, one could not possible rely only on a model (U*, interviewed by MacKenzie). For example, beginning market makers tended to imitate and copy the leading traders' whole style of trading not just use the same mathematical model (K* interview). Therefore, market makers in early CBOE knew that if they made successful trades while using the Black-Scholes model, that success would be attributed to *them* and their ability much more than to the model.

Sullivan's letter reveals that the attempt to integrate the Black-Scholes model

into the options market's regulative structure also followed similar principles:

> [...D]espite the fact that the formula produces an apparently mathematical result, the result is only an estimate[...]Thus, although the formula is extremely useful, many specialists [market makers] and clearing firms prefer to rely on their own experience and judgements in determining the extent to which a position should be hedged. For this reason we recommend that the definition that is based on a dollar delta formula contain a permissible deviation (say, plus or minus 500 shares)

(Letter, Sullivan to Plotkin, November 19, 1976)

The cultural aspects of the Chicago commodity markets and the creation of the new options market had an apparent influence on the regulatory attitude toward the exchange. As shown in the previous chapter, while the early regulatory reactions to the organised option market initiative were strictly negative, after CBOE was opened and the competitive field of options trading began to emerge a noticeable change occurred in the Federal Reserve Board and the SEC attitudes towards options trading. The existence of organised options markets was no longer perceived as a threat to the investing public and to the viability of securities markets. Nevertheless, the innovative concept of competing market makers, one of the radical ideas that came from the early CBOE, continued to attract regulatory attention. Specifically, the tensions embedded in the market making function, between individual profit-driven transactions and the market-wide obligation, were still seen by the FRB as a potential problematic area. In late 1976, the regulatory point of view was that the operation of the options market makers should be kept under strict scrutiny.

During the same period options markets underwent several developments. First, the general economic climate in securities markets changed. The first years of CBOE were accompanied by a weak securities market. Therefore, after the initial period during which most of the brokerage houses kept their distance from the uncertain, new market or invested via local traders, the relatively lucrative environment drew to become members of the options exchanges, and especially CBOE. Similarly, members of the established securities markets who were

looking for alternatives for the weak securities markets of the time followed the big brokerage firms and bought seats in the options exchange. Many of these newcomers became market makers, enhancing the competition in the already tightly competitive field. The growing popularity of options markets and of the CBOE in particular contributed to a significant change in the population of the options traders. Market makers, who in the early days of CBOE typically conducted independent enterprises, were replaced gradually by market makers who were supported by big brokerage houses and as a result the market makers' population as a whole had fewer problems financing its transactions.

The introduction of established securities firms to the options markets was accompanied by growth in the complexity of traders' portfolios and the practices through which those portfolios were managed. As described in more detail in the chapter 6, the management of large options' portfolios gradually became dependent on the use of Black-Scholes-based practices and techniques. This trend also contributed to the expansion of model-based risk evaluation systems from leading and innovative clearing firms like Timber Hill to many other options clearing members. As options markets grew in popularity, the financial relations between the traders and their 'back offices' were managed with procedures that gradually included more mathematical elements and were dependent more on the applications of formulas. As part of this trend, the model-based method for evaluating the risks of market makers' accounts became the de facto standard among options' clearing firms (I* interview). As a result, by the late 1970s options market makers, when discussing their positions with their clearing firms, used a descriptive language that was based on the elements of the Black-Scholes model. For example, when market makers argued that their positions were relatively safe they claimed that the positions were 'delta hedged' or close to being 'delta hedged' (G* interview), meaning that the ration between the number of options and number of stocks in a positions was close the risk free ratio calculated by the Black-Scholes model. That is, in spite of the fact that regulation T still at that stage did not include the distinction rule that was based on the model, participants in the options markets were already distinguishing between hedging and speculation according to results that the model produced.

While the trend described above was beginning to gain momentum in the exchanges, the staff of the SEC had growing suspicions about the rapid growth of options markets. The previous chapter shows how the regulatory approval that was given to options markets was based on a balance between the regulatory powers that this new field brought to the SEC and between the motivation to protect the investing public. During 1975 and early 1976, a period in which there was a rise in the exchanges' demands to add more stocks to their options catalogue and in which trading practices gradually became more complex, the SEC's staff became concerned that that its grip on the new market might be loosening. The SEC then suggested to the options markets to apply an agreed moratorium on the addition of new options until the SEC would conduct a thorough study of the structure and the practices of the new market. The options exchanges agreed reluctantly to the moratorium and it was imposed for a period of nearly two years between 1976 and 1978.

During the moratorium the SEC conducted a study of the options markets in which many of the model-based practices were documented and explained (Securities and Exchange Commission, 1978). To some degree the options study had a similar effect to the one that the securities special study had on the SEC in the previous decade. As a result of the options study the unique practices of the options exchanges were seen less mysterious and baffling to the regulators than they had been. It is true that many of the intricate concepts at the basis of options trading remained alien to many among the staff of the SEC and the FRB. However, several key concepts, like idea of 'delta hedging' were sufficiently understood by staff members, especially those who were involved directly in the study, who also grasped how central these concepts were to the everyday operations of options markets. In late 1978, as the options study was about to be published, the correspondence between CBOE and Robert Plotkin of the FRB was approaching its decisive period. Although Plotkin did not take an active part in the study, the team that conducted it shared the findings with the Federal Reserve Board's division of baking supervision and regulation, the division that Plotkin was heading at the time. Hence, when the division's answer to the CBOE's proposal to include distinguishing rule based on the Black-Scholes model was released it was published as part of the SEC's special study. The

Federal Reserve Board's answer was not only a physical part of the study, but its content also reflected the degree to which practices based on the Black-Scholes model had become part of the practical and conceptual part of the market environment:

> The staff also concerned that the use of the "delta model" as a formalized part of regulation T would sharpen the conflict which the staff believes currently exists between a marketmaker's [sic] obligation to the market he serves and his desire to become "delta neutral" in order to minimize his risk. [...] Incorporation of the "delta model" into the specialist credit provisions of regulation T would appear to discourage a marketmaker [sic] from assuming these risks [involved in making a market] since if he did so, he might break his "delta neutrality"[48][...]

(Plotkin, letter to Teberg, December 5, 1978)[49]

The rejection of the proposal was not based on concerns about the validity or accuracy of the Black-Scholes model. On the contrary, Plotkin did not only accept implicitly the fact that the results that the model produced were reliable and accurate, he also claimed that the fact that acceptance of the model had reached such a level of institutionalisation in the market that it may create a problem. According to the argument, market makers would prefer to follow the recommendations from their clearing firms, who would advice them to keep a 'delta neutral' portfolio instead of getting involved in transactions that would be risky if checked using the Black-Scholes model. This tendency, Plotkin continues, would add more tension to the already conflicting demands that the market makers face and would possibly make the market maker operate less efficiently than they would have without the model-based distinction rule.

The argument also refers to the general implications that the application of Black-Scholes-based practice has on the options markets. The function that

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[48] "Delta neutrality" refers to the ratio between the quantities of stocks and options at which, at a given price, the position would be free of risk.

[49] Letter from Robert Plotkin, Assistant Director, Division of Banking Supervision and Regulation, FRB to Richard L. Teberg, Director, Special Study of the Options Market, SEC, December 5, 1978. (SEC library, filed under 'Options Special Study', Exhibit 7).

market makers were supposed to perform in those markets was to supply liquidity to and by so doing to lower price volatility and turn the markets into safer economic environments. The use of the 'delta hedge' practice was aimed at bringing similar results – a risk free ratio between the options and the stocks in a portfolio was assumed to be better than any other combination of the assets and the contracts. Yet, as Plotkin claims, in the options market environment, the accumulative effect of market makers using Black-Scholes-practices would be negative: options market would be more risky if market makers in them would use risk-reducing practices. This seemingly paradoxical result is explained by the fact that market makers are required to take on risks in order to allow the market as a whole to be less volatile and less risky.

It has to be stressed that the argument made in the letter above, against the adoption of the model-based distinction rule, did not aim at refuting the scientific validity of the Black-Scholes model. Similarly, the earlier letter by Sullivan did not base its support of the rule on the assumed scientific validity of the model. Instead, the debate about the application of regulation T to options market makers shows that the institutionalisation of practices in the options market has created a validity that in that particular setting was stronger and more relevant than the scientific validity of the model. More evidence about the creation of this practical validity is given in the chapter 6. At this stage, it can be concluded that by stating that case presented in this chapter shows that in spite of the fact that the Black-Scholes model became an integral part of the socio-technical structure of the market, the rules of market were still written in the markets.

Discussion

The empirical material that the chapter presents touches two theoretical issues. Firstly, the findings help to explore the relation between culture and the development of a market's structure, the relation that was defined by Granovetter as 'embeddedness'. Secondly, the attempt to incorporate methods based on the Black-Scholes model into the regulatory practices of financial markets

corresponds to the actor-network theory's concept of recruitment. In particular, the fact that this attempt to recruit the Black-Scholes model was not successful helps to expose several of the unique elements of the financial market's techno-social environment.

The idiosyncratic culture that developed in the Chicago commodities trading community contributed to the development of the socio-technical institutions of the options market, most notably, as presented in this chapter, to the development of the competitive market maker concept. When the nature of the cultural influence over the structure of the market is examined, it is revealed that the relation between the culture and the formation of the market cannot be described as a linear, bilateral relation. The findings show that the founding team of the CBOE were not captives of their own culture and in fact treated it in a relativistic manner: used elements of the culture (i.e. the tendency to promote and encourage competition) in order to design a system that was more palatable to the regulator at the time.

This relation between culture and markets brings to the fore the question about the embeddedness of markets in pre-existing social structures. If the concept of market makers was designed to fit the interests of the actors in the market and these actors were using their culture, would it not be more accurate to say that the options market was embedded, not in the culture of the commodities markets, but rather in the practices through which this culture was performed? The findings presented in the second part of the chapter tend to support a positive answer to this question. The creation of competitive market makers demonstrates that the Chicago commodities culture was not merely a source of general values and moral ideas, but that it was equally a collection of practical knowledge about the operation of a market, and conceptual frameworks that evolved and developed along with the market activity. The options market, in itself a cross between the practices of commodities and securities trading cultures, was the arena where new concepts about the nature of products, trading and actors in the market environment evolved. The distinction between hedging and speculation had an enormous significance for the market makers and for the exchange as a whole. The ability to distinguish between transactions aimed at protecting a position and

between ones that were aimed at making a profit through taking a risk was important for the financial well being of the market makers. Furthermore, the difference between the two types of transactions also carried a moral weight. Market makers were given the responsibility for the liquidity of the market, its reputation, and ultimately its ability to attract orders. Therefore, a market maker who would prefer to take part in risky, speculative transactions would not only put his/her funds at risk but also risk the viability of the exchange. The ability provided by the Black-Scholes model, to distinguish quickly and efficiently between the risky speculative positions and between the safer hedged ones created a techno-social structure through which the normative demand could have been expressed and realised. In other words, the Black-Scholes-based risk assessment systems imposed the rules of normative behaviour on the market makers. Accordingly, these historical evens show us that the culture of the market – the value-based justifications for the rule according to which trading was conducted – did not only frame the market but in itself was embedded in the techno-social infrastructure that underlined the market activities.

The attempt to use the Black-Scholes model for distinguishing between hedging and speculation for regulatory purposes can be seen as an attempt to perform a translation. As the empirical material shows, such a translation would not have consisted only of transfer of practices based on the model from one area of the organisational structure of the market to another, but more significantly, would have included a reconfiguration of the ties between the model and the actors in the market network. In the setting of the options market, the Black-Scholes model was used initially by the clearing firms to assess the risk implied in the positions of market makers. The use of the model as a basis for the application of regulation T in cases of options market makers would have turned the algorithm, in effect, into an actor capable of performing a distinction between speculation and hedging, and thus into an actor having the authority to disperse and impose a normative message on other actors.

The case of the options market maker demonstrates the usefulness of elements from the actor-network theory to the analysis of financial markets. Most relevant in this case is the ability of the theoretical perspective to view the options market

as a techno-social environment, a fact that allows us to recognise and define the transformation in the Black-Scholes model. From a strictly technical perspective, the difference between the practices performed by the Black-Scholes model by the clearing firms and between the one proposed to be performed by the CBOE was minimal. In both cases, the same computer program would have been operated and the data fed to these programs would have been identical. The significant difference between the two practices is the context in which the results of the Black-Scholes formula would have been placed. A classification of a market maker's holdings as 'speculative' would have had a different normative meaning from the classification of the very same holding as risky by the market maker's clearing firm. Such a determination, when made by the clearing firm might have resulted in increased fees being paid by the market maker or, in extreme cases, by terminating the market maker's account with the clearing firm, thereby barring him/her from trading.[50] Yet, such steps would not have had a normative implication for the relations between the market maker and the options market. However, if a market maker were prevented from receiving the benefits of regulation T because his/her positions are viewed as 'speculative', then in effect a normative judgement would have been passed on the behaviour, and ultimately, on the personality of that market maker. As the findings in the chapter show, the weight of such normative judgement steam from the dependence of the options market on the liquidity supplied by its market makers. The market makers take upon themselves the responsibility to serve as the counterparty to orders arriving to the market, and in doing so to maintain the market's credibility as a liquid and a trust-worthy one. Hence, labelling a market maker's positions as 'speculating' would be, in the setting of the young options exchange, equivalent of declaring that the market maker is putting the exchange at risk and in effect, betraying his/her community.

Regarding the early options market as a techno-social network also helps to comprehend the significance of the fact that the attempt to recruit the Black-Scholes model to this junction of the market network resulted in failure. When examined from this perspective, the failure to recruit the Black-Scholes model is

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[50] This type of payments, known as margins, is discussed in detail in chapter 6.

seen not as a result of a rejection by the regulator, but rather as a result of the refusal of both the regulator and exchange to admit that the model has become, in the developing techno-social network, a normative agent. As the chapter shows, both the representatives of the trading community (Sullivan) and the regulator used in their arguments, for and against the further inclusion of the Black-Scholes model in the market, an assessment of the cultural and the normative commitments of the options market makers. Sullivan stated that even in the new techno-social network, in which the attentions behind the market makers actions would be detected by a mathematical formula, the trading skills of the market maker would determine the required amount of hedging. By including this statement in the proposed distinction method, the document refers implicitly to the one of the important elements of the Chicago trading culture: the trading skills of the individual traders. According to this argument, the ability of the market makers to perform their market function (and their normative duty) is dependent primarily on their skills; the technological setting in which they operate is important, but ultimately it is the personal ability of the traders which determines the success of the exchange.

A similar rationale is used in an opposing argument in the regulatory reply that rejects the proposal to use the Black-Scholes model. The argument there referred to the conflict between the obligations of the market makers to the exchange and their interest to make personal profits. As the chapter shows, this inherent conflict stands at the bottom of competitive market maker position, and as such, the founders of CBOE referred to the creation of the market maker position as a successful attempt to solve it. The regulator's view was that the inclusion of the Black-Scholes model in the regulations referring to market makers would enhance the conflict by increasing the temptation to the market makers not to fulfil their function. This view, like the one presented by Sullivan, sees the market makers as the exclusive agents in the process of determining the composition of their holdings while the model is regarded as an external device that aids in the process. Therefore, the rejection of the Black-Scholes model is in fact a two-fold one. First, the model was rejected by the culture of the commodities market. The use of the model threatened the status of the trader as the exclusive decision maker in the market and therefore the proposal restricted

the role of the model in the practices of the market makers. Second, the exclusivity of the market maker as a decision maker was recognised by the regulator, who also recognised the conflict embedded in the position. Thus, the failure of the attempt to include the Black-Scholes model in the market can be explained by the fact that both the exchange and the regulator did not accept it as an actor in the market network, thereby defending the exclusive status of the traders in the market.

Chapter 6

Talking About Risk: The development of Black-Scholes-based practices in options markets

Introduction

This chapter continues to draw the historical narrative of the evolution of options markets by taking as a starting point two of the core practices of the market environment – assessment of risks and decision-making. This chapter shows that as part of the evolution of the techno-social network of options markets these two interrelated practices have undergone dramatic changes. The evaluation of risks in options markets turned from a skill that was gradually learned and honed through experience into a techno-social practice. That is, risk evaluation became an area in which humans and practices based on the use of on mathematical formulae and on computerised systems were combined in organisational settings. As the following historical analysis shows, the markets' infrastructure itself changed to accommodate the new technological practices of risk evaluation. Moreover, bodies regulating financial markets gradually integrated tools based on mathematical models into their normative scrutiny of markets.

Most of the historical period described in the paper is characterised by rapid growth in the popularity of options as financial instruments and hence, in growing volumes of options trading. This growth was related to three interrelated processes. First, as volumes grew, trading practices and techniques changed in order to accommodate the increasing number of trading orders. The complexity of trading practices grew and the division of labour within the trading firms gradually became more specialised. Second, mathematical models gradually came to play central roles in sustaining the organisational structure. Third, the growing importance of practices based on pricing models created a situation in which the models achieved a monopolistic status in the topology of the market network. Table 1 briefly describes the three facets of the historical period.

	Trading /clearing Practices	Model-Based Applications	Structure of the Market
1973 – 1975	Single traders, scalping	Sheets with calculated prices	CBOE is the only options exchange
1976 – 1984	Inter-market distributed portfolios; Margins calculated using strategy-based method	Spreading, daily trading strategies using pricing models.	Options traded in few exchanges; Non Equity Options (NEO) added
1985 – 1987	Index tracking; dynamic portfolio insurance	NEO margins calculated using pricing model	
October 1987	Under extreme volatility, Black-Scholes-based applications are not accurate		International order books for derivatives
1988 – 1994		Testing of model-based application for net capital requirements (TIMS), approved by SEC in 1994	Theoretical prices and volatility on CBOE display boards

Table 1: Periods and important events in the history of options trading practices

Early Black-Scholes-based applications: The use of Black's sheets

As discussed in the chapter 5, the Black-Scholes options pricing model was introduced to the market participants on CBOE's trading floor from an early stage. The chapter 5 described the specific use that the options clearing firms made of the model and the implications of transformation of elements from the Chicago commodities culture to the new techno-social network. This chapter, in turn, analyses in more detail the organisational aspects of the developing options markets, focusing on the relations between the trading practices. A chronological is partly responsible for the relation between the Black-Scholes model and CBOE. CBOE started trading options based on 16 'blue-chip' stocks in April 1973, a few weeks after the Black-Scholes model was first published. By using the Black-Scholes model, one could estimate options contracts' prices. Alternatively, by using the model's equation 'in reverse' if the present price of a contract is known, then the formula can evaluate how volatile would be the rate of return of a certain options position. This result is then used to estimate how risk the options position is. This result also means that the prices of the elements composing a risk free portfolio could be discovered by comparing them with the expected yield of cash invested in a risk free interest-bearing account. This is how the Black-Scholes model is used to estimate the prices of options. First, the amounts of option and stock that compose a risk free portfolio are calculated. Then, since the cash flow generated by this portfolio is identical to the one generated by interest bearing account it is assumed that the prices of the two equal portfolios would be equal. This procedure would produce two important results. First, the formula would return the estimated price of an option contract at a certain date prior to expiry. Second, the calculation gives a ratio between stock and option that would create a risk free portfolio.

Fischer Black, one of the developers of the model, started a weekly subscription service selling sheets containing options calculated prices for each day of the week (MacKenzie & Millo 2003). This first application of the model was using a 'case by case' approach – using the bare-bones Black-Scholes formula, *one* option contract's price or risk level (volatility) was estimated each time the formula was used.

Strike Price:[51] 50.40	Date of expiration		
	Last Friday of July 1976	Last Friday of October 1976	Last Friday of January 1977
	$9.26	$9.53	$10.00

Table 2: Sample of data from Black's sheets. The sample shows the prices predicted for the 4th of June, 1976 for call options written on stocks of US Steel Corporations. Prices were calculated on 25th of May, 1976.

As discussed in detail in the chapter 5, in its early days, most of CBOE's traders came from CBOT or were related in way or another to CBOT members (C* interview) and so the practical use of Black's sheets was based on one of the common trading technique in the Chicago commodities markets – scalping (Q* interview). Scalping consisted of a basic 'buy low – sell high' tactic, executed many times during a typical trading day, utilising minute fluctuations in prices. With scalping as the main trading technique, the mode of operation of this first model-based application was as follows: traders found the theoretical value of one option contract on the sheet, compared it to the contract's market price, and then decided whether it was profitable to buy or sell. Trading in this way with Black's sheets could be seen as model-aided scalping. The sheets supplied pinpointed information to the trader, the model-calculated price of a specific option contract on a specific date.

Those decision-making aids were useful particularly for single traders operating

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[51] See glossary.

on their own for a number of reasons. First, most of the traders had relatively small portfolios. Those portfolios contained relatively small number of combined options and stock positions, typically, less than 50 positions per portfolio. Hence, the traders could estimate easily what would be the implication on the whole portfolio of selling or buying this or that contract. Second, in the first 3-4 years of CBOE many of the firms were very small and had only 2-3 traders on the floor (I* interview). For example, it was relatively easy for a small firm to make changes to their positions during the trading day in order to utilise price discrepancies between market prices and prices calculated in the sheet (Securities and Exchange Commission 1978: 130-6). In many cases, all that was required was a quick word between the trading partners to change positions in order to take advantage of a price discrepancy.

The physical structure of CBOE's trading floor also called for simple, focused trading activity. Following design principles from traditional futures trading exchanges, where the floor was typically divided into pits according to the type of futures traded (e.g. corn, soybeans, and pork bellies), the trading floor in CBOE's first site[52] was divided into small, designated trading areas (pits). In each pit, a small number of options' series were traded, typically based on 2-3 stocks per pit, and options were grouped together according to branches of the economy. In such a trading environment, a device like Black's sheets was very useful. The sheets supplied pinpointed information to the trader: price calculated, by the model- of a specific option contract on a specific date. Such information was useful to the traders for two reasons. First, most of them had relatively small portfolios, and they could easily assess what would be the implication of selling or buying one contract or another on the whole portfolio. Also, in those days, the part of the portfolio that was traded on CBOE (that is, the options, because the stocks were traded elsewhere, usually in NYSE at that period) was concentrated on the few pits the trader was specialising in. This focused approach made the use of the sheets easy from a practical point of view: the common trader had to purchase sheets only for a small number of options' series, and had fewer bits of paper to carry and manage in crowded trading pits (K* interview).

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[52] This room was previously the old CBOT smoking room (F* interview).

It has to be mentioned that the reliance on the mathematical model as a trading aid was not unanimous. At this stage, many of the traders believed that using mathematical model was not compatible with the way trading 'should be performed'. That is, according to the culture of the commodities markets. These traders believed that there was no substitution to the sharp senses and instincts which one develops in the trading pits and some even thought that using sheets was a form of 'cheating' or an unmanly behaviour (MacKenzie & Millo 2003). Nevertheless, the popularity of Black's sheets was growing and as options trading in CBOE became a set fact, opponents of the model gradually became a minority (K* interview).

'Spreading'

Between 1973 and 1977, volumes in options exchanges grew by more than 500% and the number of trading firms doubled (Securities and Exchange Commission 1978). As mentioned in the chapter 5, big securities firms entered CBOE. In addition, the local trading firms grew and typically employed one or two floor traders, but up to a dozen, along with a similar number of clerks, runners and back-office employees (F* interview). In the larger trading firms portfolio-wide changes could no longer be performed by a single trader. Although scalping aided by sheets still existed as a trading technique, co-ordination among the traders became increasingly important so that their different transactions would not counter each other. As a result, bare-boned Black-Scholes-based applications, like the pre-calculated sheets, ceased to serve as devices in their own right and were incorporated into larger, more complex, trading procedures. One of the first developments in this trend was a Black-Scholes-based trading practice known as 'spreading' (Securities and Exchange Commission 1978). Spreading was a basket term for a variety of trading techniques that were all based on a single general procedural sequence: applying a computer program that detected probable discrepancies between options market prices and between their model-generated

prices. Unlike scalping, in which the price evaluation was done for each option separately, in spreading the calculations were conducted for a wide range of options. Then the computer program compared market prices with the prices generated by the model and produced a report of the discrepancies between the two that were larger than a set threshold. The threshold, set manually by the traders, represented the transaction costs involved in executing each of the possible transactions. The reported pairs of prices for each option – actual market price and price generated by the model – represented possible opportunities for profitable trading transactions. Hence, the reports of the discrepancies between the two types of prices were in fact a first step in the creation of a trading strategy. This fact points to a significant difference between scalping and spreading. While spreading was used to detect trading opportunities to be served as a basis for the development of a trading strategy, scalping only verified existing trading strategies.

Other aspects that differentiated between practices based on pre-calculated prices, the Black's sheets and between spreading laid in the organisational setting of the different methods. In contrast to the traders who used the sheets in and practiced scalping, who by and large planned their trading strategy alone, spreading-based trading involved other people than the floor traders themselves in planning the trading strategy. With the introduction of spreading, the importance of the back office grew significantly and the organisational structure of the options trading unit, which until then focused solely on the activity in the trading floor has become more complex. In particular, the operations that were related directly to planning the trading strategy, an area of practice that previously had been the exclusive domain of floor traders.

The development of model-based trading techniques turned the design of trading strategy and many of the decision-making related to it into a communicative and a cooperative process. This change was apparent in the rising importance that planning had to trading. In the Chicago commodities markets, before the opening of CBOE, traders typically were not expected to operate according to well-rehearsed plan. On the contrary, the traders who were held in high regard in the community were the ones who excelled in reacting swiftly and without

hesitations to the changes in the market (Q* interview). As a result, commodities traders frequently entered the trading floor at the beginning of a day having only broad ideas about their potential trading moves. On the other hand, as model-based developed, referring to predicted prices gradually became a central aspect of the trading. The growing popularity of options and the increasing competition that it brought with it motivated even traders who did not believe initially in the accuracy of the model's predictions to compare their trading moves with the predicted prices (F* interview). This added a relational aspect to options trading. In the presence of prices' predictions, trading did not take place only on the trading floor, but was accompanied by a constant echo of price predictions coming from the traders' offices and from the back offices of the larger trading firms that joined CBOE.

The addition of more options to the trading catalogue of the exchanges, and the entry of larger trading firms to the markets brought a change to the relation between the floor and the predicted prices. Planning turned from an almost optional practice that accompanied trading on the floor to the central part of that practice, which pre-empted the actual trading. Traders who used Black's sheets were able to take advantage of the market/model price discrepancies only if they noticed them *during* the trading day (K* interview). Spreading, on the other hand, was planned, before the beginning of the trading day, by people at the trading firm's back office, not necessarily by traders themselves. In addition, planning before trading was based on discussions not only among the traders, who used to be only decisions makers, but also among the various function holders in the trading firm: the managers, the computer specialists who operated the trading programs and the floor traders. At the beginning of the day, a trader would enter the trading floor already equipped with estimates about which options were 'overpriced' and which were 'underpriced', according to the model, and the daily trading strategy was tailored with respect to these pre-empting assumptions.

Another difference lay in the nature of information that the trades received from the methods. Unlike the immediate and highly specific information that was provided by Black's sheets, the typical results of a spreading procedure were

broader guidelines that stated recommended ranges for profitable buying and selling. Spreading, apart from automating the actual position-by-position calculations, also added a new stage to the process of the design options trading: the computer-generated estimates of trading day provided the market participants with a conceptual and informational basis for discussion. Moreover, because the estimated price ranges on their own did not produce definite sets of instructions for the following trading day, such discussions were an inherent part of the spreading procedure. Instead, the results, along with other information, were discussed, risks and opportunities were evaluated and an overall picture of the trading day was assessed, leading to the design of a recommended daily trading strategy.

Fundamentally, the discussions in the trading firms revolved around the fact that the results that the Black-Scholes-based application supplied give the market participants across the various functions related to option trading (risk evaluations, trading day designs, traders, portfolio managers) a common, agreed-upon set of descriptors all of them could use to communicate, discuss and elaborate the risks and the opportunities that the market situation seemed to present. The communication capabilities that the model-based application played an important part in the shaping of the options trading environment because the different functionaries were responsible for various aspects of option trading and thus had different viewpoints on the process, which, in turn resulted in different descriptions of it. That is to say, such applications enabled market participants to express risks in terms that were accessible to others and to construct clear picture of the market situations. As the following historical narrative shows the communicative characteristics of model-based applications did not only became indispensable tools for discussion of market situations and for decision-making, but also influenced the organisational and political aspects of the market.

As discussed in chapter 5, in the early stages of option trading in CBOE, much as in the commodities world from which it sprang, trading was an expertise that was learned through apprenticeship. A trader would typically start her or his career as

a floor runner[53], a job that they would do for 1-2 years before advancing to become junior partners in the trading firm. Even as a junior trader, the partner would generally seek advice from the senior and more experienced partners. In firms where daily trading plans were designed with the aid of model-based applications, a new factor was added to the decision making process – the input provided by the application. For example, an enthusiastic young trader could offer a daring trading strategy, against the advice of a senior partner, relying on the results produced by the model. Similarly, referring to a prediction offered by the application could bridge over the differences between opinions about the route that should be taken in a certain situation (O* interview). Gradually, the information coming from the application became a computer-generated a reference point in the evolving techno-social environment that was available for 'recruitment' by all parties in a discussion.

Multi-exchange option trading

The importance of such a common communicative platform in options markets increased when option trading spread from CBOE to other exchanges. By 1977, four other exchanges were trading options as well: the American Stock Exchange in New York (AMEX), the Pacific Stock Exchange in San Francisco (PSE), the Baltimore Stock Exchange (BSE) and the Philadelphia Stock Exchange (PHLX) (Securities and Exchange Commission 1978). As discussed in chapter 4, although options trading has gained significant popularity, until the early '80s, the SEC did not allow for the same option contracts (i.e. based on the same underlying asset) to be traded simultaneously in more than one exchange. This restriction was the source of many disputes between the exchanges, often ending in costly litigation and increased animosity. The SEC imposed a procedure aimed at limited such disputes, a procedure that contributed to the influence of model-based applications on the developing market environment. The regulatory procedure for the allocation of stocks between the exchanges was nicknamed the

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[53] The floor runners' main task was to deliver order notes to the trader from the back office and execution notes from the trader to the bookkeeper.

'NFA league draw' due to its similarity to the methods used in the selection of football players who graduated from colleges for the National Football Association (C* interview). A draw was made among the exchanges that wanted to trade options to determine the order in which they would pick the stocks that would serve as bases for options. The first exchange would be the first to choose from the list, then the second one and so on; in a similar manner to the way American football players were chosen by teams, hence the nickname. The main result (and indeed, the intended one) of the 'NFA league draw' was that each exchange had a different variety of options to offer to the traders. In addition, because the stocks were chosen by a descending order of attractiveness, each exchange had a fair number of attractive options to offer – options written on stocks that were virtually in everybody's portfolio. The fact that good options were evenly spread between the exchanges meant that portfolios had to be distributed as well. By 1977-8, it was no longer feasible for any broker firm to have traders on the floor of just one options exchange. The local Chicago firms had to extend their trading activity to the East Coast markets either by buying seats in these markets or by using local brokers. The giant NYSE-based brokers had to do the same and extended their activity that had been concentrated around the NYSE, to the other, smaller, option trading markets.

The result of this restriction led to distribution of options among the exchanges. In order to build and maintain a diversified portfolio, traders had to execute trades in many exchanges across the country. That fact gave an advantage to the nation-wide firms that had traders in all exchanges over the local firms that typically traded only in one of the exchanges. Thus, as mentioned in chapter 5, by the late '70s witnessed a change in the ecology of the options traders' population. The Chicago-based firms that originated from the commodities trading markets and initially dominated CBOE were accompanied by big, nation-wide firms that entered options markets as extension to their securities trading (Securities and Exchange Commission 1980).

The large brokerage firms typically maintained large portfolios, containing thousands of positions, distributed among four or five different exchanges and their trading activity was conducted by a few dozen trades. The initial

communicative challenge facing market participants in such a market environment was two-fold. First, an agreed-upon communicative medium describing portfolio risks was necessary. Second, the highly complicated information contained in the large portfolios created a potential challenge for market participants who wished to cooperate in trading. An effective communicative medium had present portfolios in a relatively simple, coherent, and manageable format. By that stage, the sheer size and complexity of options portfolios had practically ruled out a direct model-aided risk evaluation of the type that had been used in the spreading methods. Therefore, when managing a portfolio of such proportions, the conceptual framing underpinning the design of trading strategies has changed. For example, there was little sense in asking the question: 'what are the risks and opportunities involved in my present positions?' There were simply too many possible answers to this question to serve as a basis for planning a strategy (I* interview).

Facing this problem, trading firms started to consider a different approach to model-based risk evaluation. Instead of calculating theoretical prices for each of the positions and then summing up these results, the new approach took a hypothetical end result as its starting point. In other words, the operational question of this new risk evaluation method was: 'what if the market drops/rises by X percent tomorrow, how would that affect my portfolio?' To answer such question, risk evaluation techniques assumed a hypothetical market movement of a certain size, say of 10%, then calculated the result that the market movement would have on each of the positions, and finally summarised the results so as to come up with the overall implication on the portfolio. In essence, the systems simulated possible future market scenarios by using results coming from the Black-Scholes model.

Scenario-simulating systems added another dimension to the communicative aspect of the techno-social network. The applications did not only create a reference point for market participants' common knowledge base but also represented the complex market picture in a clear and coherent way. When using scenario-simulating systems to design their trading strategy, market participants were no longer confined to concrete results from the market but were able to

resort to predicted future situations. In effect, scenario-simulating systems became an unavoidable mediator between the market and its participants. In the early 80s, in the market environment in which simulated scenario were used so heavily, the planning of trading strategies was based mostly not on information coming directly from the trading floor but instead on information produced by model-based applications. For example, even the information that was still originating directly from the markets was 'mediated' by model-generated results. In order to simplify the positions, these were presented as percentage of the previous day's gain/loss predictions and not as absolute numbers (Securities and Exchange Commission 1986).

Moreover, scenario-simulating programs transformed the communicative possibilities of market participants. In options markets scenario-simulating applications did not only supply reference points for discussions; they were the factor that allowed the very existence of such discussions. While the use of spreading merely enhanced the ability of traders to communicate their ideas about trading strategy, the new type of applications were the tools with which such ideas were generated in the first place. When using a spreading technique, a trader could only illustrate the benefits of the trading strategy she/he already planned. However, with the scenario simulating applications, it was likely to receive the initial idea about possible trading opportunities by examining the program's output. Thus, the presentation of scenario simulating technology extended the techno-social role of Black-Scholes-generated results beyond the communicative aspect that previous model-based applications had. For example, after the presentation of scenario simulating applications traders started to talk about 'buying volatility' or 'selling volatility', meaning that model-based applications indicated that risky asset of various degrees should bought or sold in order to balance the portfolio (MacKenzie & Millo 2003).

The development of the model-based trading practice induced changes in the social structure of the options exchanges. Organised options trading started as a single-person practice. Each of the traders operated on his own: interpreting and making decisions in a solitary manner. The first Black-Scholes-based applications were designed for that mode of operation: sheets with estimates of

individual options prices that allowed the traders to make quick, on-the-fly decisions about risks and opportunities that appeared during the trading day. As options trading became more popular and trading firms employed more traders, the decision-making process also changed. Since more people became involved in the trading activity than before, co-ordination among the traders become highly important and decision-making was transformed from being a quick and solitary practice to an action that was preceded by deliberate discussions. Black-Scholes-based techniques and applications like spreading played an important part in that transformation by providing the decisions makers, that also gradually became discussants, with common reference points for the developing discussion about risk assessment. Thus, when designing a strategy for trading, the predicted price ranges in effect enabled efficient communication and discussion among market participants.

Options clearing in the early years: pros and cons of the strategy-based method

As seen in the previous chapters, the creation of options markets' techno-social network was not limited to the practices and techniques of the trading floor, but consisted of interactions between the various market participants: regulators, clearing firms, the staff of the exchange, and, in the historical case that this chapter is focusing on, the options clearinghouse. Prices and risks related to options positions were a matter of concern not only for the traders but also for the options clearinghouse (Options Clearing Corporation – OCC[54]) and for the SEC. The clearinghouse and the SEC had a crucial effect on the development of risk-evaluation systems. Earlier sections of this chapter describe how the Black-Scholes pricing model affected trading practices, this section will explain how, due to the clearinghouse and SEC's involvement, the model was integrated into the markets' infrastructure, thereby turning them into an integrated techno-social

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[54] Since OCC was the only options clearinghouse for organised exchanges at the discussed period, the text refers to it as "the clearinghouse".

network.

Fundamentally, an options clearinghouse ensures that future obligations of buyers and sellers of options, which are embedded in the options contracts, are met. Such possible events in which traders may not perform their part of the contracts are often connected to high levels of price volatility. This connection made the options clearinghouse an interested party in the methods used to measure and apply this variable. Conceptually, the clearinghouse's function similar to the one filled by the market makers. The main difference between the two was that each of the market makers was in charge of supplying liquidity to one or two options, while the clearinghouse was responsible for the whole market. To prevent the risk of one of the parties not performing its side of the contract and to ensure that the market as a whole remained liquid and trustworthy, the clearinghouse was assigned as the immediate buyer of options from the sellers and the immediate seller to buyers. That is, sellers and buyers did not transact directly with each other, but with a clearinghouse. Being the 'other side' of the contracts (until expiry or offsetting) the options clearinghouse was exposed to considerable risks. In order to protect against those risks, the clearinghouse collected a set portion of the contracts' value as collateral (known as margin).

Apart from its own margins, OCC - the first options clearinghouse - was also responsible for the calculation and collection of another risk-related fee – the SEC's net capital requirements. According to the SEC's net capital rule[55], traders who regularly executed transactions for others, collectively known as broker-dealers (or 'brokers')[56], were required to make daily deposits of specified amount of money, known as net capital. Unlike margins, the net capital rule's purpose was not to protect the clearinghouse, but to protect broker-dealers' customers. The net capital rule was designed to protect such customers in case their

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[55] The rule to which the paper refers is the revised net capital rule from 1975. Prior to the 1975 amendments (the net capital rule was written originally in 1942), brokers had to deposit a set amount of capital at the beginning of a trading day, regardless of the risk level associated with their positions (Seligman 1982).

[56] The largest group of traders who managed accounts on behalf of others were the broker-dealers, who were registered with the SEC.

positions were inadvertently involved in risky positions held by their brokers. If such losses did occur then the pre-deposited capital would be put towards covering them.

OCC was initially formed as part of CBOE, as an exchange owned clearinghouse. However, soon after its formation, the clearinghouse gained an independent status financially (although it had still organisational ties with CBOE) and began clearing for all other exchanges that traded options. In the first 3 years for its operation, two different methods were used in the clearinghouse for determining the amounts of margins fees and net capital requirements. For the clearinghouse's own margins a premium-based method was used. That is, fixed premium was paid regardless of the positions' components (Seligman 1982). The net capital requirements, on the other hand, were calculated using a strategy-based method. The strategy-based method of risk-evaluation was based on a set of categories that assigned various levels of risk to the various assets and contracts. For example, options were considered more risky than bonds, so the required deposit for options was larger than the one for bonds.

The fact that two separate methods were used for the evaluation of the same factor, market risk, caused uneasiness within the trading community. I*, who was a senior executive at the clearinghouse from the late '70s to the mid '90s described the early years of option clearing:

> At about 1977-8, OCC had a premium-based margin requirements and we were barraged with requests to convert the margining system to something like the way the net capital rule worked at the time, which was strategy based as well. The requests for the changes came from the trading community, principally, and they came in with graphs and numbers and said something like: 'My risk is limited to this, you should never charge me more than this in margins'

(I* interview)

Brokers and other traders, who had to pay both the SEC's capital requirements and the clearinghouse's margins, demanded from the clearinghouse to stop

charging margins according to the premium-based method and to move to the strategy-based method that was already used in the 1975 revised net capital rule. From the traders' point of view, the premium-based method was problematic because it did not reflect the growing complexity embedded in options positions and trading methods. Because options were often used to minimise risk levels, charging a flat rate for all options positions, regardless of the implied risk embedded in them, was defeating the purpose of using options altogether. Furthermore, as the quote implies, by the mid 70s a growing number of the trading firms used sophisticated methods for the evaluation of risks embedded in their positions. Again, having to pay considerable sums as margins after having implemented advanced and costly model-based system was cause for frustration.[57]

Traders were not the only ones who demanded changes in the methods used for the calculation of margins. As the historical narrative shows, organised options trading was an emerging, and a highly competitive, financial practice in the mid '70 and each of the exchanges that traded options wanted to attract customers. Since OCC was the only options clearinghouse at the time, it faced demands from all exchanges demanding on behalf of their members, the traders, to charge less for its services. Facing those pressures, in 1977 the clearinghouse replaced its method for margins calculation from a premium-based method to strategy-based one (Securities and Exchange Commission 1986). The new calculation method was seen as a positive move by both the brokers and the exchanges. However, from the clearinghouse's side, the move entailed some significant problems:

> [The] strategy based approach, intuitively for OCC, would have complicated the nightly margin calculation process to such an extent that, because everybody was increasing volume on the CBOE, we were worried that we would not be able to get the exercising assignment notices and the reports out in time, if we had to calculate margins for the

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[57] Many of the traders who were 'barraging' the OCC with requests for change of the methods used the risk assessments produced by their clearing firms, as explained in the chapter 5.

entire market place. [58] What they[the traders] wanted you to do was to take large accounts with all sorts of positions and break them down into components, strategies, and minimize their margin requirements. Mathematically, it was an optimisation problem that would have required iterative calculations.

(I* interview)

Unlike the premium-based method, in which every transaction was charged a pre-determined rate and hence was relatively easy to perform, the strategy-based method required a more arduous procedure. Each portfolio (typically including between 100-200 different options and stocks) and many more is several cases had to be broken down to basic positions defined in the rule. For each of those positions a risk level (in the case of net capital requirements) or margin payment were determined and then the calculated amounts were summed up, producing the daily margin payment or the net capital requirement. Risk levels were expressed in the form of 'haircuts' – discounts applied to the original value of the positions. The riskier the position was, the larger the haircut was. Furthermore, because there were several possible ways for breaking down complex positions to simple ones, there were also several alternative levels of payment that could potentially be demanded. That meant that the clearinghouse had to perform an optimisation process for each of the portfolios to determine which of the possible splitting of the positions would result in the minimal payment satisfying the rule. The combination of the two processes that needed to be preformed by the clearinghouse: breaking down the positions to basic ones and finding the optimal ones and the fact that these procedures had to be done nightly so that payments, in or out of the traders' accounts, could be made the following morning for the next trading day, put an enormous pressure on the clearinghouse's clearing system.

Performing the margin calculation process increasingly became difficult not only because of the growing volumes, but also because of the increasing

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[58] Exercising assignment notices informed trading firms about the amount of daily margin they were required to pay.

sophistication of option trading. As explained in the first section of this chapter, options were usually traded in tandem with stocks, or several series of options (options with different expiration dates and strike prices) were traded as a package. Even before organised option exchanges existed, traders used complex strategies to utilise and amplify options hedging and leverage abilities and after the opening of CBOE, the organised market for trading of options, strategies became ever more sophisticated. For example, one of the popular strategies consisted of simultaneously buying and selling options from the same series, but with different strike prices. By creating such positions, traders 'covered' a range of possible future stock prices, at, or near, expiration date. To calculate the margins for such positions, the procedure should calculate the risk level of each of the options contracts paired with stocks in the positions and the all the combinations of the options themselves, broken down to pairs. Therefore, the complexity of strategies increased the workload of the clearinghouse considerably. The more separate strategies there were the more conditions and rules had to be built into the computer programs that performed the actual splitting into basic positions. The calculation process that was already stretching the clearinghouse's computing resources, due to the increased volume, became even more demanding as more variables had to be taken into account when evaluating the risk level of each position. The development of sophisticated strategies presented yet another problem to the options clearinghouse. The clearinghouse had to add increasingly complex rules into its calculation system. One of the consequences of the increased demands from the clearinghouse was that occasionally it was attempted to lessen the enormous workload by 'simplifying' the strategies. Instead of following all the possible routes in order to find the minimal net capital requirements in a complex portfolio, simpler positions were chosen and portfolios were charged accordingly. J*, who was responsible for the implementation of the net capital rule at the SEC describes:

> [...]and then you have First Options [a firm for which OCC did the clearing] who would have 800 large portfolios to clear and they [OCC] have to do it account by account. So it involves a lot of computing power. They would just say: 'We're not going to do that one. We'll just ignore that strategy because it involves six more permutations.'...And the

> market maker [trader] will get angry or would question them and say: 'Look. If I'm doing it then my real risk is that and you're charging me for this."

(J* interview)

As options strategies became more complex, such disputes between the clearinghouse and the clearing firms broke more often and added furthermore to the workload that the calculation of margins presented.

The interconnected nature of the options market network contributed to the fact that the clearinghouse's situation was reflected, in part, by the SEC. The division of market regulation was in charge of overseeing trading and clearing practices. As such, the division was in charge of applying the changes made in the net capital rule and for designing, along with the self-regulatory organisations (the exchanges) new risk evaluation methods. Each time a new strategy was presented by traders, SEC had to examine it according to the net capital requirements, to see if the proposed strategy complied with the rule's definitions, thus making the rule's maintenance work more cumbersome and time-consuming than before. The rapid growth in options trading volumes created a situation in which some personnel at the division of market regulation of the SEC spent much of their time adjusting the net capital rule to the flux of new portfolio strategies. This situation was a cause for much concern in the division of market regulation since one of the main purposes of the net capital rule's 1975 amendments was to make the determination of net capital requirements more straightforward and efficient than they had previously been. J*, who was a senior employee of the SEC's division of market regulation from the mid '70s described:

> Our role had gotten so complicated when strategies have constantly been replaced with other strategies. It has become very hard to function in that environment. No matter what you did, there would be another one.

(J* interview)

Again, the difficulties of the SEC were fed back into the market environment and had implications for other market participants. Concern was developing

about the discrepancy between the sophistication of portfolio-construction methods used by trading firms and between the relatively crude risk-evaluation practices that were imposed by the regulator. J*:

> I would hear that [complains about clearing], but what were we going to do? I mean, that was the rule. They were the ones who wanted the complicated strategies. I wasn't the one saying: 'I want you to do these complicated strategies.' They wanted to do them. Then they would, obviously, have to do the work.
>
> (J* interview)

That discrepancy was fundamentally rooted in the different viewpoints that the SEC and other market participants (namely, trading firms, the clearinghouse and the exchanges) held about risk-assessment. From the regulatory point of view, the main purpose of the net capital rule was to protect customers by collecting 'back up' funds for the case of a loss, and the clearinghouse indeed collected these funds. In addition, since the funds were not expected to cover fully the losses in any case, the exact amount was of little significance as long as it was above the set minimum.[59] Therefore, from the SEC's perspective, a strictly exact measurement of risk was less important than the fact that a rule defining positively the collection of deposits existed and was being exercised. On the other hand, from the traders' point of view, sophisticated portfolio strategies were critical in achieving an advantage over competitors. From this respect, a relatively crude net capital rule would have defeated that purpose: there would not be much use to employ sophisticated positions' strategies if the benefits coming from their complexity were lost through the use of a simple net capital rule, and high net capital requirements were charged for them. The aforementioned combination of factors – high volume of trades, sophisticated strategies and a lagging regulator – lead the clearinghouse in the late '70s to look for alternatives for the existing margin calculation mechanism.

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[59] The minimum value of net capital for registered broker-dealers (after their first year as broker-dealers) was set at $250,000 or as 6 2/3% of the total debts (SEC 1975)

Model-based applications and clearing

In the early '80s, two of CBOE's prominent trading firms, CRT (Chicago Research and Trading), and O'Connor & Associates, were using scenario-simulating risk-assessment systems and many others were to join them in the following few years. When I* and his team in OCC started to examine alternatives for the strategy-based margin calculation system, they immediately encountered the new approach:

> I was going to graduate school and one of my graduate school's teachers was also a CBOE market maker and he taught me options price theory and I started to talk to him. The idea was worth a try and we convinced the board [of the clearinghouse] that they should fund some study. [An external company] began to calculate potential theoretical values for us on a daily basis for all the options series for a one year period and internally we built this program that would calculate a margin requirement equal to the worst possible [daily] loss on a line by line basis [comparing the two calculation methods]. We ran that for a year, then we wrote another report to our margin committee.

(I* interview)

The system developed by OCC applied a similar scenario-simulating principle to the one used by trading firms when planning their trading strategies for the calculation of required margins. The difference between the two was that while trading firms estimated the maximal daily loss in order to minimise it, the clearinghouse used the estimates as the required daily margin deposit. OCC and the trading firms were two different market participants and had different agendas to promote; yet both chose the same technological approach to do so. From a first glance, it might seem as if a plausible explanation for this adoption was that in both cases the uses of the model-based risk assessment technology was motivated by trust in the reliability of the applications used. However, the historical narrative of the evolution of the options markets narrative reveals a more complex answer. Trust in the applications, although it probably played a role in the process, was only one aspect of the organisational and regulatory

changes that were related to the Black-Scholes model. In the quote above I* described the beginning stages of a process which lasted more than 10 years. In the late '70s and early '80s the movement to model-based practices took place mainly within the trading firms, and the clearinghouse as I* mentioned, joined in only later. Trading firms were relatively quick to implement model-based systems for a number of reasons. First, as options markets became more competitive, innovative practices that had the potential to improve the effectiveness of trading were eagerly adopted. Second, between 1973 and 1979, option trading was given the status of a pilot programme and both CBOE and OCC were subject to strict supervision of the SEC. The pilot programme status meant that for every change to the trading or clearing practices, prior approval from the SEC was needed (SEC 1972). Trading firms were not subject to such close SEC scrutiny as OCC and CBOE and could therefore implement trading systems without receiving prior approval from the SEC.

Apart from the regulatory reasons, CBOE's organisational structure (of which OCC was still part at the time) was also related to the elaborated implementation process of model-based application. I* mentioned that he needed to get an approval from CBOE's margin committee to run a feasibility study and to report to this committee. This is a good example for CBOE's committee-based mode of operation: a way by which members, who were all partners in trading firms, discussed and decided about the shape of the exchange. That unique management system, which gave full representation to the users of the market, also meant that it usually took considerably long time to shape proposals. In addition, after proposals were submitted to the committees, making a decision involved political manoeuvring and lobbying to ensure majority in the committees' votes.

The fact that the implementation process by OCC was longer than that of the trading firms had proved to have a determinative effect on the shape of the techno-social network of options markets. During the period in which the scenario-simulating margining system was developed in the OCC and was gaining internal organisational approval an important shift took place in financial markets, a shift that had a significant influence on the development of margining systems – the appearance in the market environment of cash-settled contracts.

Chapter 7 discusses this development and its implications at length. Here the main events are discussed briefly. Between 1929 and 1981, according to American federal and state laws, options and futures were allowed to be traded only if the contracts explicitly stated that a delivery of goods or assets was part of the transaction.[60] In the case of options, for example, at or before expiry stocks were to change hands. It is true that most options did expire unexercised and most futures were being offset.[61] Having said that, the crucial point from the legal perspective was that contracts could not have been settled through transfer of cash alone. The ban on cash-settled contracts was put for a number of reasons, mainly because it was conceived as a form of betting - one party agrees to pay the other a certain amount of money if some event takes place.[62] In 1981, this federal rule was changed thus allowing the trading of contracts whose settlement was based solely on the transfer of cash payments and not on the delivery of the assets on which the contracts were based.

Many of the '80s cash-settled contracts were based on market indices. Indices are weighted averages of assets' prices in securities markets. Being aggregates, indices were regarded as indicators of the state of the market as a whole. For example, if a certain index indicated that the market rose or dropped by a certain amount and a person held a portfolio that, to a certain extent, represented the various stocks traded in the market, it would be very likely that the portfolio and the index would show similar movements. Therefore, derivatives contracts based on indices could help traders to protect against, or take advantage of, market movements. For example, if a person decided that she would like to receive compensation if the Standard and Poor's 500 index (S&P)[63] dropped below a certain level, (because in this situation, the value of her portfolio would drop significantly), she could buy a contract giving her the option to receive a set amount of money per index point. If at any time before the contract expires, the

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[60] See Kibler (Kibler &Molinari 1983) for a detailed description of the history of the rule.
[61] That is, prior to expiry a future that virtually cancels the obligations of the one bought originally.
[62] It is interesting to point out that the idea of options based on non-equities (e.g. the Dow-Jones index) was older than CBOE itself. The fact that cash-settled contracts were relatively late to enter the derivatives world may indicate of the strength of the American anti-gambling cultural barrier.
[63] An index representing the 500 most heavily traded stocks in American market. Some of the most successful options contracts were based The S&P 500 index.

S&P drops below the level stated, the person holding the contract could exercise it and receive a sum equal to the number of points the index dropped below the level stated in the contract times the amount per point.

The example above shows how useful index options can be for traders: a whole portfolio of assets could be protected from sudden moves by buying just one contract. In addition, the same contract could still protect the portfolio even if its composition is changed. In 1981, the CME - Chicago Mercantile Exchange (an exchange that specialised in futures) presented the first index-based, cash-settled contract, and it quickly became successful. Additionally during the time when CME was seeking approval for its cash-settled contract, other major exchanges were developing similar contracts and so, between 1981 and 1987 the financial world witnessed a remarkable growth in cash-settled contracts.[64]

Because of the differences between index-based and stock-based options, the clearinghouse had to reconstruct its reserves and fund allocation mechanisms so that they would be suitable for the clearing of cash-settled contracts. Therefore, for the clearinghouses, the appearance of cash-settled, non-equity contracts (i.e. in the CBOE's case, options that were based on securities) meant that a new system for clearing had to be developed, regardless of whether the margin calculation would be based on strategy-based methods or on pricing models. The risks themselves were still had the same nature as in stock options, as both the traders and the clearinghouse were still facing the same market movements and the uncertainty imbedded in them. For the clearinghouse, this new demand to develop a clearing system for non-equity options coincided chronologically with the aforementioned examination of the feasibility of the Black-Scholes-based margining system:

> Because non-equity options was a new product and we were building a new margin program. We had to program a new system to clear [them] anyway

(I* interview)

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[64]Between 1982 and 1986 more than 50 different non-equity based contracts were submitted to the SEC and the CFTC (the American regulator in charge of futures) for approval.

Since the margining system for non-equity options had to be built from scratch it was regarded in OCC as a good opportunity to include in it the new model-based margining technology they were developing at the time. In this sense, the emergence of non-equity options, although their presentation hardly changed risk evaluation techniques per se, served as an inducing agent as well as a platform for the implementation of the first model-based margining system.

During the same period there was another development that made the application of pricing model to computer program easier than it had been previously. In a series of articles published by Cox, Ross, and Rubinstein (Cox, Ross &Rubinstein 1979; Rubinstein 1994) they developed, and then empirically tested, an options pricing model. The model used the same equation that was developed by Black, Scholes and Merton but instead of using continuous time mathematics to tackle the stochastic issue at the heart of the option pricing challenge, the time to the expiration of the option was divided to finite intervals. For each of the discrete time periods, the probabilities for the prices to rise or to fall were calculated, then summed up to provide the theoretical price of the option at the a given time.[65] The fact that the model was based on finite time intervals gave it expanded capabilities in comparison with the Black-Scholes model. The Cox-Ross-Rubinstein model (as it became to be known) could take into account of events that could not be built into the Black-Scholes partial differential equations; event like the payoffs of discrete dividends on the underlying stock.[66]

The appearance of the Cox-Ross-Rubinstein model coincided with the ending stages of the transformation in the typical profile of trading firms from small ones, which were based on the operation of one or two traders on the floor to the large, multi-exchange ones. For the small firms that still relayed to a large extent

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[65] To be precise, the 'risk-neutral' probabilities were calculated, determined by the assumption that no arbitrage possibilities exited, and not the actual probabilities of the prices to rise or fall (more detailed discussion about the assumptions behind options pricing models can be found in chapter 5).

[66] For practical reasons dividends had to be paid in discrete payments and this fact rendered many of the estimates made with the Black-Scholes model inaccurate.

on decisions that were made by the single trader while on the floor the Cox-Ross-Rubinstein model was of little use. The model used an algorithm that had to be repeated many times (once for each of the time intervals) and its accuracy relied on the length of the finite time interval entered - the shorter the interval, the more accurate the end result is. The need in repetitions meant that in order to end up with a reasonably accurate result, in a fairly short time (as the Black-Scholes model provided) it needed computing power that in the late '70s and early '80s was far beyond the capabilities of any calculators that could feasibly be carried by traders on the trading floor. However, for the bigger trading firms, which based their activities on central processing practices, the newer model offered advantages. Because the Cox-Ross-Rubinstein model was in itself an algorithm, rather than a 'stand-alone' differential equation, that needed to be adapted to a computer program, it was easier for computer programmers to include it into existing computer programmes already used by the firms. The fact that the application of the model needed relatively high computing resources converged neatly with the rest of the centralist trend mentioned before: the algorithm had to be run during the night in the main office and the results were transmitted to the traders in the different exchanges. As a result, between 1981 and 1984 the Cox-Ross-Rubinstein model became the basis for many risk-evaluation applications and indeed, with the existence of this technological tool, it can be said that the move from 'simple' model-based methods to portfolio-wide scenario generating systems was completed (O* interview).

After the development of model-based system was completed and used for the calculation of margins, OCC was required to submit to the SEC proposals describing the nature of changes it made to its rules. As part of the reporting process, the clearinghouse was required to publicly request comments for the proposed changes and to report on the comments received. Between December 1985 and April 1986 the clearinghouse submitted proposals regarding its new margining system for index-based options, a system dubbed NEO – Non Equity Options (Securities and Exchange Commission 1986a; Securities and Exchange Commission 1986b). From a strictly legal perspective, the rule changes regarding NEO were an internal matter of the clearinghouse and the public inspection process there was more of a formality than a substantive procedure. As the

historical narrative shows generally, the SEC was extremely cautious with regard to approving new practices and rules. Therefore, from a sociological and a political point of view, in this case, the fact that the NEO rule was not rejected meant that the SEC implicitly accepted the new rule, and the concepts at its basis. However, the fact that the SEC did not object the clearinghouse's implementation of NEO was an important step, but it was still very different from giving official regulatory legitimacy to the Black-Scholes model. Margins, as noted above, were designed to protect OCC from possible contractual incompliance by the clearing firms. The SEC's own net capital rule, on the other hand, was directed at a population that was seen as much more vulnerable than professional traders – the investing public. The events described in Chapter 4 show how influential was the organisational value of protecting the investing public among the staff of the SEC. Although by the early 80s options markets were a set fact and an integral part of the American financial landscape, as the story of the net capital rule shows, the SEC's staff still paid particular attention to the potential dangers that options trading represented to the investing public. As a result, potential innovators like the options clearinghouse had to cross a much more significant conceptual barrier when proposing model-based system for the net capital rule than the one crossed at the option margining case.

By 1986, model-based applications have developed to the stage where they served as a discursive bridge between the trading community and the clearinghouse. For example, as mentioned before, traders were continually negotiating their margin levels with the clearinghouse. Typically, the two parties had different opinions about the levels of risks embedded in a certain position. However, because both sides accepted on the method by which risk was measured and represented, communicating the different opinions to each other was straightforward. Consequently, both the clearinghouse and traders had stakes in the promotion of these model-based applications. Traders based their co-ordinated trading activity on the applications and the clearinghouse found in model-based margining system an answer to the problems of growing volume and complexity. SEC's point of view on the applications was different. It is true that the growingly popular options markets had brought about an explosive growth in trading strategies and those had to be approved by the SEC, but

essentially the net capital rule system functioned properly. Money was collected from brokers, and investors, as far as the SEC could judge, were being protected. Hence, while the clearinghouse and the traders were relying on model-based applications and were eager to extend their use, the common opinion among the SEC's staff about the application was still sceptic (Interviews J*, E*). Paradoxically, the event that helped to persuade the SEC to approve model-based applications for net capital rule calculation and join the model-based communicative community was an event in which dozens of broker firms went bankrupt - the October 1987 market crash.

The regulatory approval of TIMS

By October '87, model-based risk evaluation systems were present in virtually all of the major broker firms' offices as well as in options clearinghouses and had become the *de facto* standard in options markets. [67] On the third and fourth weeks of October 1987, American markets experienced the worst weekly drop in asset prices since October 1929. Since stock prices dropped sharply, options, which were designed to lessen the effect of such situations, were in extremely high demand. (Brady 1988) Furthermore, because many investors were selling stocks to try to cut their losses, price volatility reached record levels. Many pieces of evidence show that between the 19th and the 22nd of October 1987 Black-Scholes-based applications did not calculate prices and volatility correctly (MacKenzie & Millo 2003). In fact, in a few cases it was reported that the computer systems displayed call option prices that were *higher* than the market price of the stock for which the option was written (J* Interview). Since call options give their owners the right to buy stocks, the market price of a call option cannot exceed the price of stock for which the option was written.

Although this paper does not discuss the possible theoretical reasons behind the

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[67] Another pricing model, based on the same mathematical assumptions of the Black-Scholes was developed by John Cox, Stephen Ross, and Mark Rubinstein (Cox, Ross & Rubinstein 1979; Ross 1977; Rubinstein 1994) gained significant popularity during the time period described in this paper.

fact that the models were not reliable in October 1987, it has to be said that some of the basic premises on which the models were established were questioned, if not shaken, because of the events. Among the questionable assumptions was the validity of the hypothesis that prices followed a lognormal distribution. Based on the lognormal distribution is the assumption that the 'further' an event is from the mean, the less likely it is to occur. According to this assumption (among other things), the Black-Scholes model is being used to estimate the prices of options. On the 19th of October 1987 and more so in the following week, it appeared that the assumption about the lognormal distribution of prices did not hold. For instance, events that had very low probabilities and, thus, were expected to occur very rarely (i.e. once in a few decades) happened a few times a day (Rubinstein 1994). For many market participants it became apparent that under such extreme conditions (for example, the NYSE dropped 21% on the 19th of October, its biggest one day drop since the 1920s) model-based applications were not calculating prices accurately.

The first Black-Scholes-based system was approved for the calculation of SEC's Net capital requirements in 1994 (Securities and Exchange Commission 1994, 1997). The SEC issued a 'no-action' letter about the use of TIMS in 1994 (Securities and Exchange Commission). The meaning of the letter was that no action would be taken against bodies that used TIMS. The final, unrestricted approval of the system was granted in 1997 (Securities and Exchange Commission). The system was dubbed TIMS - Theoretical Intermarket Margining System.[68] Remembering that for the better part of the '80s the market regulation division of the SEC did not approve such systems, one might ask what made the SEC approve TIMS when it did. This question becomes even more interesting when we consider that between 1984, when NEO was first introduced to the SEC and between 1994, when TIMS was approved, the October 1987 market break took place. Knowing only these facts, it would seem that the October '87 break would be the least likely event that could motivate any regulator to support model-based applications. However, the October 1987 crash

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[68] TIMS was the name chosen by OCC to show appreciation to the system's main developer – Tim Hinkes.

and its effect on the regulatory approval of Black-Scholes-based applications should be examined according to the role that those applications were playing in the techno-social environment of options markets.

The problems that the Black-Scholes-based applications faced in October 1987 were given different interpretations by the different communities that were related to the events. According to E*, who was the director of the SEC's division of market regulation in 1987, the problem during the October 1987 market crash lay not with the Black-Scholes model but with the practices that evolved around it:

> Black-Scholes is not necessarily inappropriately allocating risk or measuring risk between instruments. A trading strategy, based on those valuations that presumes you can do on a repetitive basis what you can do on an isolated basis and that apparently presumes, despite all of the complicated and sophisticated analysis to get there, that the world is more static than dynamic, was striking, at least to me, that anyone could made those assumptions.
>
> (E* interview)

According to E*, the constant use of Black-Scholes-based applications, especially in times of extreme volatility was the core of the problem. In other words, Black-Scholes-based applications would probably be sufficiently reliable if they were used sparingly and cautiously and not be relied upon. Scenario-Simulating applications, because of the central role they played in options markets, could not possibly fall under the 'isolated basis' use - those applications were based on countless repetitive calculations of single positions, from which the overall 'gain/loss' predictions were created. Equally, the applications were in constant use because of their communicative value - they virtually became the exclusive 'view finder' through which both traders and the clearinghouse 'saw' the market. Seen in this light, after the 1987 crash market participants came to the realisation that Black-Scholes-based applications were a double-edged sword. The constant use of Black-Scholes-based applications - the very practice that

made them dangerous in times of extreme volatility - also made them extremely useful in all other times.

This was the common perception of Black-Scholes-based system among the many market participants following the 1987 crash; this perception also played crucial part in the regulatory approval that was granted to TIMS. J* was an assistant director in the SEC's division of market regulation in the late '80s and early '90s. In this position J* headed the team that examined OCC's system that was later dubbed TIMS. The examination of the systems lasted several months during 1990-1 in which the SEC and the OCC conducted comparative tests of the performance of TIMS and of the then existing strategy-based calculation method. At the completion of the tests, it was concluded that TIMS provided more reliable and accurate results than those produced by the strategy-based system. That is, TIMS predicted daily gain/loss amounts that were closer to the actual market results than the ones determined by the strategy-based system. However, the test period was a time of relative calm in the markets, leading to the fact that TIMS was not tested during periods of extreme volatility like the ones that existed in October 1987. The results meant that under ordinary market conditions TIMS would provide appropriate amounts of net capital, but what would happen in times of extreme market conditions?

J*'s answer to this question was simple:

> [TIMS] is good for business purposes. Obviously, a businessman should know what his risk is from day to day. He should also have an idea at what the worst thing that could happen to him, more or less. [I]n the ordinary circumstance, not much capital is needed from day to day. You only need it in stress times. Stress times don't occur that frequently. So the model is always wrong. Because it will not give that stress capital.

(J* interview)

J*, as many other market participants was aware of the fact that under extreme conditions Black-Scholes-based applications did not provide accurate results. Equally, the SEC's staff was aware of the fact that virtually all of the market participants used similar systems. From a regulative point of view, it was more important to approve a system that was acceptable by all market participants but was unreliable under the infrequent extreme condition than to have a system (strategy-based rules) that was resented by most of the market participants.[69] This argument is rooted deeply in the SEC's regulative worldview and in particular the intention behind the net capital rule. The rule was designed to protect customers from the possible adverse consequences of positions they did not explicitly intend to hold. That is, if a broker constructed risky positions using customer's money, without the direct intention of the customers, and the positions resulted in a loss, the customers were entitled to compensation. However, in times of extreme volatility, when prices in the markets, as a whole, fluctuate wildly, even conservative positions could be risky. In other words, the net capital rule was not designed to protect from events of the type that occurred in October 1987. Therefore, it was of little significance that the model used in the rule was inaccurate when such events happened.

By the early '90, when the SEC tested TIMS, Black-Scholes-based applications had already served as the agreed-upon communicative and organisational basis for option trading and for the calculation of margins by the clearinghouse. The regulatory approval of TIMS, like the approval given to CBOE in the early 70s, indicated not only that the preferences of the SEC about options markets changed, but also that a more fundamental change took place. The dominance of

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[69] This duality brings to mind Bloor's analysis (Bloor, 1978) of the reactions to social anomaly (comparing Imré Lakatos' and Mary Douglas' approaches).

model-related practices in the options market environment had a significant impact on the SEC's perspective of the markets. In particular, the concept of the 'common businessman' was influenced by the awareness that the model had become the common language in the market. When J*, the SEC's senior employee, mentioned that 'a businessman should know what his risk is from day to day', he did not merely make a normative conviction that was based on the rules and the regulations of the SEC, but one that draws its power from a more general set of values. That is, market participants should know what risks they are facing every day because this is the optimal way for action in markets to be conducted – 'it is good for business purposes'. In other words, the use of model-based tools and practices no longer represented only the interests of one group of market participants or another, instead by this stage it has became a social fact, part of the taken-for-granted reality of the options market environment.

The suggestion that TIMS, like other Black-Scholes-based applications, was more important for the organisational and social role it played in the markets than for its accuracy is potentially strengthens by yet another finding. Following the unreliable results that the Black-Scholes model produced under the extreme volatility of 1987, in the early 90s OCC developed a version of TIMS that did not depend on the Black-Scholes model's lognormal random walk (Hinkes, personal communication). In this newer system, OCC made use of another set of statistical distributions, the stable Levy distributions, with infinite variance, in which extreme events like the ones of October 1987 are far more likely to occur than on the system based on the lognormal distribution. The margining system based on the stable Levy distribution has the virtue that sudden increases in price volatility, because they are 'expected' by the distribution, do not lead to sudden, and large increases in margin demands. This version of TIMS, like the NEO system in the mid 80s is used for the calculating of OCC's own margins and therefore did not require a regulatory approval of the SEC. Nevertheless, as of late 2001, the SEC's own net capital requirements were still calculated according to the Black-Scholes-based system. As the historical narrative presented so far shows, from the SEC's regulatory perspective it is more beneficial to help to maintain and preserve institutionalised market practices, ones that constitute a successful techno-social network of connections, than to replace them with new

practices, albeit those being arguably more accurate and advanced.

Discussion

The historical process described in this chapter reveals how options markets gradually developed into a complex techno-social network. The chapter continues the description of the historical narrative about the relation between the Black-Scholes model and the evolution of the organised options exchange. This chapter reveals that the options pricing model was a nucleus around which market participants developed the structures and the practices of the new techno-social network: first trading techniques, then clearing procedures, and lastly regulatory definitions. This development of ties that constituted the market network was related to the development of a communicative layer among the actors. As the findings show, the evolution of the network connections led to the fact that the organisational and technological infrastructure of the market became dependent on model-based applications. As risk assessment techniques gradually became the standard descriptive language among market participants, the constitutive power of the communicative layer increased substantially. As the findings show, by the early 80s options markets had turned into a techno-social network where there existed no other method to assess risk, and act according to the assessments, apart from using the model-based risk assessment language. At that stage the dependence on the institutionalised model-based practices was so profound that it virtually reached a 'fail-safe' condition – the accuracy and the reliability of the mathematical model on which the risk assessment techniques were based became relatively insignificant in comparison with the assessments' communicative and organisational benefits.

This analysis of the historical narrative brings to the fore the question about the sources and the nature of power in the techno-social structure of financial markets, and in particular, the distribution of power between the human actors and non-human ones. As discussed in chapter 2, the concept of structural holes (Burt 1992) can be used as a starting point in a discussion about power in market

networks. An actor can use the lack of connections between actors in the particular area of the network, the 'hole', to reroute connections between the separate clusters of actors, and thus gain a position of power. For example, model-based systems allowed managers of portfolios that were distributed among several exchanges to have clear picture of the risks and opportunities that the market conditions offered. This ability, in turn, enabled the portfolio manager to direct specific transactions orders to the traders at the various markets. Hence, it could be said that the model-based application mediated between the manager and the traders and, by supplying predictions about prices and risk in fact maintained the connection in that part of the network. Following this argument, it can be said that the creation of the structural holes was induced by the model-based applications. The placement of the model-based applications in junctions of communication and control among the various organisational units of the market (e.g. between the clearinghouse and the traders, and between regulator and clearinghouse) gave rise to a gradual rerouting of the connections from direct ones between the actors, to connections mediated by the applications.

The development of model-based applications and their convergence with the rest of the market's network generally tends to support the hypothesis about the formation of structural holes. At the same time, this initial correlation between the theory and the empirical material presents questions that may help to explain the nature of power in financial markets. Burt predicts that actors that place themselves in structural holes, or (as the case here shows) being placed in such topological areas of the network due to asymmetric development of the network, would tend to accumulate power in relation to their neighbouring actors and the actors in general. If we assume that the model-based applications did become more powerful because of their placement in structural holes, then it should be asked: what is the meaning of ascribing a position of power to a non-human actor? Answering this question may help to gain better understanding of the nature of control in financial markets. The empirical material in this chapter shows that options markets have developed to become environment where human and non-human actors interact closely. Therefore, knowing what type of powers the non-human actors have in these environments may help us to understand who in effect controls financial markets.

These demands reveal the limitations of Burt's theory. The conceptual tools of structural holes do not explain how the power in the network setting is accumulated and exerted apart from referring broadly to the structural setting through which certain actors may develop relative advantages over others. In contrast, to understand how non-human actors, like the model-based applications, influence the dynamic structure of the network, it is needed to be able to analyse the relations between actors across power differentials: how the more powerful influence the less powerful ones. Furthermore, another limitation of the structural holes hypothesis is that fact that it does not accommodate for the existence of non-human actors. As discussed in the literature review and demonstrated in this chapter, if differential power relations developed between the human and the non-human actors in options market, those relations were based to a large extent on the differences between the actors. Most notably, the practical exclusion of human actors from the practices performed by the non-human actors may serve as a basis for the development of differential power relations. For example, Because of the growing volumes and increasing complexity of options positions it became virtually impossible to assess the positions of the market makers using only human assessment. As a result, the trading firms and later the options clearinghouse chose to use model-based methods that were more efficient than the manual methods used previously.

A possible way to conceptualise the nature of the differential power structure of options markets while taking into account the unique nature of non-human actors is to take the internal procedures that the non-human actors perform, rather than the influence of the outcomes of these procedures, as the starting point in the description of the network. This perspective accentuates different aspects related the network from the ones to which the structural network approach typically grants most of the analytical attention. Thus, for example, the fundamental question in the analysis of a market network would not be 'what is the topological structure of the network?' but instead, 'what does each of the actors do?'. This follows the assumption that the nature of the actions performed by

each of the actors affects the formation of the network's power structure.[70] If the nature of the actions performed by the actors is the starting point for the analysis of the network, then would be useful to regard the model-based applications as a 'calculative space' (Callon and Muniesa 2002). Following Miller's concept of 'calculative practices' (Miller 1998), Callon and Muniesa's 'calculative space' offers a tool for the analysis of socio-technical networks. A calculative space is an organisational structure that supports the performance of an algorithmic set of mathematical procedures. For example, a supermarket cashier performs a calculative space. The different items brought to the cashier: fruits, vegetable, canned food, etc. are identified according to an indexical database, which includes a description of the items and their prices. A simple mathematical manipulation, summation, is then performed on the results of the data retrieval process and the final outcome of the procedure taking place in the calculative space, the bill, is being achieved.

This example reveals several conceptual traits about the nature of power in techno-social networks. The calculative space also constitutes a structure of power, in which its users are put. Returning to the supermarket example, the seller and the buyer, by taking part in performing the calculative space, implicitly agree to follow its rules: the buyer has to pay the sum produced by the calculative procedure, and the buyer is expected to receive the payment. It is true that when the practice is being performed both buyer and seller are subjected to the rules of the calculative space and as such need to participate in the actions. However, when this description is being transposed to more structural level, it can be immediately seen that the power relations in the calculative space are asymmetrical. The actors who have more control over the performance of the calculative procedures have more influence on the nature of interactions that take place when performing practices based on the procedures than the others who use the calculative space. In other words, the power in calculative space is a result of the fact that the calculations produced by the algorithm, when placed in the particular organisational settings in the market (e.g. calculations of margins by

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[70] Uzzi's analysis of the garment industry in New York (1996), refers to the different activities performed by the actors, but the analysis refers mainly to the creation of cooperative links rather than the formation of a power structure.

the clearinghouse) are regarded as scripts – sets of detailed instructions.

The calculative spaces produce more than one type of scripts. In addition to the scripts that derive directly from the calculations, the socio-technical apparatus that consists of calculative space also produces 'structural' scripts – information which describes the algorithms, legitimises them, and helps to maintain the organisational contexts in which they are used. These scripts are typically more 'monotonous' than the calculations themselves, and their content changes less frequently. Using the supermarket cashier as an example, the 'structural' information that is communicated in this calculative space is embedded into the spatial arrangement of area around the cashier. For example, the narrow and short aisle that is next to the cashier, in which there is space for only one shopping trolley, implicitly dictates that in order for the calculative space to operate in the most efficient way, customers need to form a queue in front of the payment point and then to enter one trolley at a time to the aisle. The structural scripts are the tools that produce legitimacy for the existence of the calculative space and, in so doing, provide general guidelines for the performance of practices in the calculative space.

In conclusion, it can be said that the combination of Burt's structural approach and the praxis-based approach of the calculative spaces helps us to understand the characteristics of power that non-human actors in a techno-social networks have. The findings in the chapter show that gradual increase in number and importance of market practices that were connected to model-based applications brought about a situation in which these non-human actors gained the ability to maintain order in the market. For many market participants, both the content of their actions and the rationale behinds those actions stemmed from the results that the applications produced. Similar level of influence was evident at the structural aspects of the market. As seen in the chapter, the institutionalisation of the relations between organisational actors in the market, such as the relations between the SEC and the options clearinghouse was influenced by model-based practices like the calculation of net capital requirements. In fact, the formalised configuration of these relations, the TIMS computer program and the approval given to it, were founded almost entirely the use of the model. Hence, the power

of non-human actors in the market consists of their ability to impose order in market; both structural order, which is founded on the institutionalised practices embedded in the material infrastructure of the market, and practical order, the ability to compose and disseminate detailed set of instructions for market participants.

Chapter 7

Safety in Numbers: The maintenance of conceptual distinctions and the creation of Index-Based Contracts

Introduction

Arguably, one of the most significant developments in the history of financial derivatives markets was the presentation of contracts that were based on 'abstract', or 'synthetic' entities (Steinherr 1998). Such derivatives contracts, instead of having a specific equity or a commodity as their underlying assets,[71] were based on 'synthetic assets' - results of mathematical calculations. The most popular of those synthetic assets were the price aggregates known collectively as stock indices. Essentially stock indices were results of mathematical procedures that summarised the price movements of groups of individual stocks.

This chapter describes the events that surrounded the development and the regulatory approval of index-based financial contracts. The chapter describes the series of events that contributed to the gradual built up of the different regulatory and commercial frames of references about indices. The chapter then focuses on three issues that played pivotal roles in the interactive process that shaped the new markets. First, the question of index-based contracts and the definition of gambling are discussed. Second, the arguments of the two regulators about the definitions of index-based contracts are described. Third, the struggle over the determining definition of indices' broadness is analysed. This chapter also adds another dimension to the historical perspective that the thesis portrays. The cases described in the thesis so far show that exchanges and regulators took equally important parts in shaping of markets for financial derivatives. The case analysed

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[71] The underlying asset is the economic entity on which a derivatives contract is based.

in this chapter adds another layer to our understanding of this shaping process by focusing on the relations not only between the regulators and the exchanges, but also among the regulators themselves. As the case in this paper shows the financial regulatory field includes several regulators, each of them promoting a separate agenda that follows a unique historical background.

How the different views about financial Futures developed

Chapter 4, which discusses the regulatory approval process, reveals the multifaceted involvement of regulators in the market-shaping process. This chapter adds another layer to this involvement. The approval of index-based derivatives could serve as a good case study to illustrate the complexity involved in the relations between markets and regulators.

As described in more detail in the chapters 4-6, many of the challenges concerned with the regulation of financial markets came from the conceptual difference between equities and contracts based on them. The presentation of index-based contracts added another dimension to the conceptual construction that regulators and exchanges developed. The differences between 'real' equities and abstract ones were related to several fundamentally important issues in American legal structures, most prominently, the distinction between investment and gambling. In addition, the proposal to use 'synthetic assets' as underlying for contracts touched a few conceptual differences between the two regulators that had a claim over the contracts. This section provides historical background to the issues that underpin the story of the regulation of index-based products. The development of financial contracts that were based on indices was related to the promise that such contracts would give the derivatives exchanges a potentially infinite source of underlying assets. The equities- and commodities-based contracts were dependent on their primary markets for underlying assets and, as the secondary markets became more successful, and more contracts were based on securities and commodities, those gradually became a relatively scarce resource (see chapter 4). Synthetic underlying entities like indices, on the other hand, could be 'manufactured' by derivative exchanges regardless of the primary

markets.[72] In the historical context of the American derivatives markets, a potentially independent source of underlying assets was particularly attractive to exchanges. During the mid '70s, the SEC maintained a very restrictive policy with regard to securities that were allowed to be used as underlying assets for stock options: only a minute fraction of the traded stocks were allowed to be used as underlying and options on each stock were allowed to trade in one exchange only. As described in chapter 4, that policy led to increasing competition among the options exchanges for 'available stocks' and added motivation to the search for less restricted source of underlying assets.

According to the American Securities and Exchange Commission's rules financial products that trade in public exchanges, as well as new trading or clearing practices in those markets must undergo a process of examination before they are approved to be used in the markets (Securities and Exchange Commission 1949a; Securities and Exchange Commission 1949b). Proposals for new products have to be presented to regulators, be examined, corrected and proposed again in a process that includes numerous iterations and negotiations, which frequently takes several years. The nature of this process had critical influence over the way financial markets were shaped. In this process, agents who represented the regulator and the market took part in a discursive interaction – they competed over whose set of interpretations would be accepted and would be used as a blueprint for the new product or market. Those interpretations represented the ways in which the actors perceived and used fundamental concepts like risk, safety and validity.

As discussed in chapter 2, in spite of recent developments, there still exists an influential intellectual school within the disciplines that study regulation that refers to regulatory actions primarily as reactions to developments in the 'regulated area'. As the findings in this thesis suggest, this perception of the relations between the regulators and the rest of the market participants, is not compatible with the history of options markets. An analysis according to this

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[72] David Gray of the Chicago Board of Options Exchange was quoted saying: "anybody can come up with an index about anything. All you have to do is plug in the securities and come up with the price". (Goodman, 2000)

school of thought would have presented the accord that regulated the trading of index-based contracts (the Shad-Johnson accord) as a regulatory reaction to developments in the markets. The findings in this chapter, on the other hand, show that the accord was just another stage, albeit the most visible one, in a continuous struggle among regulators and exchanges over the accepted definitions regarding indices and index-based products. Equally important were the events in which the competing political and commercial sets of ideas and the different interpretations were formed.

Pivotal to the story of the shaping of index-based futures is the remarkable journey that futures markets made from agricultural commodities to the forefront of financial sophistication. Without delving too deeply into the social history of commodities markets, three factors demand particular attention: the exchanges' membership organisation, the mediation function that the organised futures markets took upon themselves, and their project of standardisation of agricultural commodities. Historically, markets that traded futures contracts based on commodities appeared earlier than the ones trading securities-based contracts. The first American market to trade commodities-based contracts, the Chicago Board of Trade (CBOT) started trading in 1848. The CBOT, from its beginning, like many other commodities markets, was owned by its members – the traders (Cronon 1991).

The case of the CBOT provides further supports to the central argument made in the theoretical framework chapter about financial markets as institutions. The fact that the exchange was owned by its members meant that the CBOT as a market was not merely an abstract aggregation of the supply and demand forces but a concrete organisational form. Since the exchange was established by the trading community, the fundamental motivation behind it was to encourage and maintain active trading in agricultural products. It is true that the Chicago commodities traders were part of the region's commercial community. However, unlike the producers of commodities, the traders made their living solely from market activities, (i.e. buying and selling either for their own accounts or brokering for others) and therefore depended on active markets for livelihood. Hence, one of the CBOT's core organisational goals was to maintain a high

volume of trading and to search constantly for ways to increase the volume. Although the traders traditionally specialised in trading contracts based on agricultural products, essentially from the commodity traders' point of view what was traded was less important than whether whatever was bought and sold was done so in large quantities and thus generated large trading volumes.

The two other historical factors mentioned at the beginning of the section, the mediation function that the commodities exchange filled and the standardisation of agricultural commodities, were related to the nature of contracts that the exchange traded. The commodities-based contracts traded in the CBOT contained mutual obligations of the buyer and the seller to, respectively, deliver and pay for a specified amount of product (of a certain quality) on a set date. Those contracts were concerned with future events and were manifestly presented as tools for limiting the risk of farmers and of merchants. For example, a typical futures contract might include the obligation to deliver 20 tons of potatoes of a given variety and of a given quality at a given date in return for a set amount. The contracts were originally designed for the needs of the two specific parties to the future transaction and thus had no use outside the particular setting. That type of contract, known as forwards, was the first type of futures to be traded in CBOT, in 1851. However, CBOT standardised the forwards that previously had been designed individually and thus made the *contracts themselves* tradable, not only the commodities underlying the contracts. The standardised, tradable forwards were called futures. The significance of the standardisation process was that any two members of the exchange could become part of a future transaction by simply buying and selling standardised contracts. By doing so, the CBOT started the historical process through which the products and the market's infrastructure gradually merged into techno-social network. The creation of such an network, however, was not the goal towards which the traders operated. Instead the standardisation move was motivated by the traders' desire to make trading as easy and as affordable as possible and thus to encourage more transactions to take place. The standardisation concept was also applied to the underlying commodities. Members of the commodities exchanges wanted as many kinds of commodities to be defined according to indisputable standards because the more standardised commodities there were the more types of

contracts there were to be traded potentially. By standardising both the contracts and the commodities, the exchange eliminated the time-consuming stage of negotiations over the details of the contracts (e.g. quality of product, time of delivery) and hence made trading faster and more efficient. The exchanges' continuous motivation for standardisation came to be, over the decades, an important source of influence over decisions in the agricultural world (e.g. the ease with which a certain product would be turned into a standardised tradable commodity played a role in the decision whether to grow that product or not) (Jamey 1985).

In 1925, after a long and troublesome development process,[73] the CBOT set up the first commodity clearinghouse. By setting up a clearinghouse, the individual traders were relieved of the risk that the 'other side' of a transaction would not fulfil their contractual commitments. Essentially, the CBOT's clearinghouse took the part of seller for the buyers and was a buyer for the sellers, leaving the clearing process ('matching up' the buys with the sales) to be done by the exchange. The creation of a clearinghouse lowered part of the transaction costs - the part associated with finding a counter party to the deal. With the existence of a clearinghouse, parties to each of the contracts did not even have to know each other. Thus, the CBOT went a step further in its efforts to make the futures trading procedures more efficient than previously and again, this innovative step was done for the sake of volume enhancing. The creation of the commodities futures clearinghouse also created a new level of involvement between the exchange and the agricultural community. This involvement was a consequence of the risks embedded in the nature of the clearinghouse. By becoming a mediator between any two parties in each transaction, the clearinghouse was exposing itself to potentially huge liabilities. In case of failure by one of the parties to the contract to deliver either the goods or the payment for it, the exchange would have been held responsible. So, as a protective measure the exchange set up reserve warehouses where large amounts of the underlying commodities were stored and also designated special 'liability funds' to be paid out in cases of buyers default. Because of this step, CBOT turned into the biggest

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[73] See (Easterbrook 1986; Hindley 1985).

buyer of agricultural commodities in the in Midwest. As a result, during the early decades of the 20th century virtually no large-scale grain transaction could have been made without using one of the commodities exchanges' reserve warehouses (Ferris, 1988). Both standardisation and the existence of the commodities clearinghouses with their reserve warehouses turned the futures exchanges into a crucial part of the American agricultural community and, as seen in this chapter, into a formidable political force in the regulation process.

As mentioned before, members of the commodities exchanges, although having their evolution intertwined with that of the larger agricultural community, had some distinctively different purposes. While suppliers and users of the products made their profits from activities outside the market, traders relied solely on trading for making profits. Because of this reason, the exchanges were constantly looking for new products on which to base their futures contracts. One way to expand the contracts' catalogue was to define new standardised categories for existing products (e.g. new grades of corn) and encourage trading in these new products. However, that strategy was of little use if a whole agricultural branch went into a slump. In such cases, the exchanges had to find new commodities, to design new contracts on them, and to promote the contracts among their members. Over the years, at times of weakening in the commodities markets 'traditional' products (grain, cattle) dozens of other contracts were developed and offered, among them plywood, soy bean, soy meal, frozen concentrated orange juice and many others. Similarly, as discussed in chapter 4, that motivation also led to the constant search for new products and eventually to adoption of non-agricultural products as underlying assets for futures.

Expansion of commodities markets and their regulation

Futures contracts were underpinned by agricultural commodities (e.g. corn, pork bellies, orange juice, and lumber) and virtually all of the commodities traders were related in one way or another to that milieu. These organisational ties between the exchanges and the rest of the agricultural community placed the

exchanges in the public mindset as part of the agricultural world.[74] The trend according to which new agricultural futures gradually replaced existing ones was echoed in the development of commodities markets' regulation. In 1914, the Cotton Futures Act regulated that section of commodities market. As commodities exchanges added more products to their contracts' lists, a more comprehensive Grain Futures Act followed the Cotton Act, 8 years later. Those acts, which served as the early building blocks of the Federal regulation of commodities trading, were amalgamated in 1936 into the Commodity Exchange Act. The 1936 Act created a specific body within the Department of Agriculture – the Commodity Exchange Authority (CEA) – that regulated specific agricultural futures (Commodity Exchange Act, 1974).

The connections between the futures markets and the agricultural community and the regulatory attachment of the markets to the department of agriculture created an attachment between the type of contracts – futures and agricultural commodities in general. That connection, which was based on organisational and cultural factors, was maintained for almost 70 yeas since the beginning of commodities regulation. However, the commodities' exchanges' determined drive to expand their supply of contracts was about to break the connection between futures and agricultural products. In 1969-1971 the agricultural commodities markets witnessed a period of low trading volume (Yamey 1985). That period coincided with the gradual demise of the currencies gold standard; a process which allowed currency exchange rates to 'freely' float (Markham 1987). The fact that currency exchange rates turned into a relatively more volatile factor than they had been meant, from the commodities exchanges' point of view, that currencies became a potentially lucrative basis for futures contracts. Such a promising business opportunity could not have gone unnoticed for long by the member of exchanges, especially after having witnessed fledgling commodities markets for more than 2 years by that time.

In spring 1971, Leo Me lamed of the Chicago Mercantile Exchange (CME)

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[74] Commodities markets have also included traditionally precious metals. However, that branch of the field has been limited to specialising parts of the commodities-trading community and was therefore only marginally affected by the event described below.

started to promote the idea of trading futures contracts based on currencies (Melamed 1988). Melamed's initiative, the International Monetary Market (IMM), an exchange that traded futures based on currencies, started to operate in April 1972. The volatile post-Breton Woods currency markets contributed to high volumes in currency futures and within a short period of time the new type of futures became a success. Within months the CEA received notices from many other American commodities exchanges about their intentions to submit proposals for non-agricultural futures (R* interview).

The presentation of currency futures signalled the beginning of a cultural and political paradigm shift in futures markets. First, futures contracts were no longer exclusively associated with agricultural products and as a result, the very concept of commodity was broadened. As currencies futures showed, futures could be written for anything that was related to production or trading in modern markets. Second, the sudden liberation from the association to agricultural products meant that commodities markets were starting to detach themselves from the organisational, social and cultural milieu in which they developed. By trading futures on non-agricultural items, like currencies, commodities markets were approaching different business communities. However, the detachment process, whose beginning was manifested in the creation of the first organised market for currency futures, was slow and gradual. For more than a century, the agricultural community promoted the message according to which one of the main reasons for the existence of futures trading was the benefit of the farming community, because the futures contracts mechanism allowed farmers to ensure a steady and fair compensation for their hard work. Indeed, the Midwestern agricultural communities and commodities markets did share a historical and cultural background and the bonding ties between the markets and the rest of the community are proclaimed and well nurtured (Fallon 1998; Tamarkin 1993). For example, the connection of the CBOT to its agricultural roots is symbolised visually by a 30 ft statue of the Greek goddess of grain, Ceres, which stands on the top of the exchange's building in Chicago. Nevertheless, such demonstrated signs could not cover the fact that actual futures trading itself was gradually detaching from the farmers' needs. For decades before the opening of IMM most futures trading was not carried out on behalf of producers and the industry, but

strictly for the sake of profit making from trading. For example, the vast majority of futures contracts were not settled in delivery (most estimations were that only 3%-5% of futures transaction settled in delivery of the goods on which the futures were based[75] (Clark 1978; Markham 1987).

Currency futures brought about changes from yet another aspect. For the first time in more than 50 years of regulation by the Department of Agriculture, the underlying asset of a commodity futures contract was not an agricultural product. Concerns were raised that the financial futures, being an unknown territory for the Department of Agriculture, might slow approval of contracts. As seen earlier a continuous stream of 'fresh' underlying assets was a necessity for the futures trading industry, and as such swift regulatory approval process of new contracts was crucially important. Moreover, the CME's currency futures seemed to be just the first step in the new direction and soon ideas were heard about futures on a variety of other non-agricultural products. It seemed that if indeed development of futures on financial products was the direction that the industry was taking then the knowledge discrepancy between the exiting regulator and between the expertises needed for approving financial futures was only going to be more intense.

Such view point led CBOT, as one of the leading commodities markets, to initiate an intensive lobbying offensive in Washington with the intention to bring about a change in the commodities regulatory structure. CBOT's agenda was relatively specific; they had a regulatory structure they believed was more desirable than others had, and, more importantly, there existed a possible structure they desperately wanted not to exist. Concern about the expertise of the futures regulator in was only one of the factors that had an effect on the CBOT's regulatory preferences; an equally significant cause for worry was the identity of the regulating body that would replace the Department of agriculture. As seen earlier, futures on non-agricultural products lost their immediate association with

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[75] The rest of the transactions were settled by offsetting the obligations in the contracts through buying/selling 'opposite' ones (e.g. an owner of a contract which puts her under the obligation to sell 500 tonnes of potatoes would buy a contract that sets an obligation to sell the same amount of potatoes of the same variety and quality at the same time. The contracts would be given to the clearinghouse, thereby 'offsetting' them against each other).

the agricultural world. Therefore, futures on financial products, since they were no longer associated with the traditional commodities background, were open to several competing regulatory interpretations. One particular interpretation that the CBOT was particularly concerned about was the one that would define futures on financial products as securities and consequently give the regulation of the contracts to the Securities and Exchange Commission (SEC).

As described in more detail in chapters four and five, the same weak trading period in grain markets during the late 1960s, which motivated the CME's to develop currency futures also drove the CBOT to fund research into the possibility of trading options on stocks, a venture that led to the establishment of CBOE). Options, being underlined by stocks, were seen as securities themselves and thus the SEC was given jurisdiction over the contracts. By the late 1960s, the SEC had gained an undeniable reputation for being a professional, thorough and strict regulator and for its staff, which became famous for its meticulous and relentless style of inquiry. As seen in chapter 4, one of the SEC's organisational characteristic was that each major proposal submitted to the SEC (e.g. the approval of a new exchange or a new type of contract) had to go first thorough a meticulous examination by its staff.

CBOT options' founding team experienced SEC's staff meticulous examination directly. CBOT's proposal to trade stock options in an organised exchange underwent a long and exhaustive approval process by the SEC. In the CBOT case, the regulatory process took more than three years and involved much by hard work by a team of lawyers and the exchange staff. In the light of this background, in early 1973 when the commodities exchanges' lobbying achieved to bring about a Congressional hearings about the future of futures regulation, one thing was obvious to CBOT's people: they did not want the new financial futures to end up being regulated by the SEC. R*, at that period a CBOT lawyer who was heading the lobbying effort in Washington:

> [...] the CBOT people said: 'Damn! We're not gonna go through all that again. We're gonna make sure that whatever agency comes out of that Congressional process, for the futures community, has

> exclusive jurisdiction over everything and nobody else is going to torment us for three years the way these guys did three years ago

(R* interview)

The commodities exchanges that lobbied for the creation of a new regulatory structure realised that the CME's currency futures opened the floodgates and soon futures based on a variety of financial products would be proposed. That situation, the CBOT team to the committee suggested, may lead to an administrative hell in which an exchange that would offer, say, futures on T-bills, crude oil and orange juice would have to go through separate approval procedures with the Treasury Department, with the Department of Energy and with the Department of Agriculture. Furthermore, whenever a change to the contracts would need to be made, each of the agencies that regulated the underlying products would have to be notified. From the commodities exchanges' point of view, then, in a world where futures were no longer limited to agricultural products, regulation according to the underlying products was no longer feasible. Instead, the exchanges' lobbying suggested to Congressional hearing committee that the new agency would have exclusive regulative authority over all futures contracts. In other words, a new regulative principle was presented, regulation according to the type of the derivative contract (e.g. futures, options), and not according to the type of the underlying asset (agricultural, financial). The "exclusive jurisdiction over everything" that R* mentioned referred to this proposed regulatory principle.

The new approach was accepted by the Congressional committee and in May 1974 the Commodity Exchange Act (CEA) of 1936 was amended as to facilitate the creation of a new regulatory agency - the Commodity Futures Trading Commission (CFTC). As implied by its name, the new regulator was assigned in charge of futures and was indeed given an exclusive jurisdiction over the approval of all futures contracts. The definition of the CFTC's regulatory domain was potentially problematic as much as it was innovative. The 1974 Act that created the CFTC gave statutory authority to an expanded definition of the commodity concept; a definition that included virtually any tradable asset, financial or physical (1974). This definition created a conceptual blur between

commodities and securities and brought about potential uncertainty about the regulatory domains of financial markets. For example, being the exclusive regulator of futures the CFTC had jurisdiction over futures on any asset, including, potentially, securities. However, the SEC already had exclusive jurisdiction over securities and over stock options. So, if futures on securities were to be proposed which of the two, CFTC or SEC, would regulate them?

Such questions were not merely theoretical. In October 1975, the CFTC approved an application by the CBOT to trade futures on a financial product - mortgage-backed certificates known as GNMA's (US GAO, 2000:5).[76] At the same time, an application by the CME was pending to trade futures on Treasury Bills (Johnson 1976) and several of the other 12 American commodity exchanges had applications in various stages of completion. The underlying assets for those contracts were not stocks and shares, but the SEC's staff felt that the distinction between commodities and securities was gradually eroded and thus followed the emerging trend of financial futures with much concern. The concerns that the SEC's staff felt about the CFTC were related to the threatening possibility that the SEC's jurisdictional turf would be limited, but they were also underpinned by a more general perception about the nature of commodities markets and their regulation. A senior staff member of the SEC's division of market regulation in the mid 70s described the SEC's staff attitude to the CFTC:

> The CFTC has always been a horrible regulator. [...] People who moved from the SEC to the CFTC thought that the CFTC was the end of the world. They were dealing with a bunch of dinosaurs over there. They just could not get them to understand the need for any kind of regulatory oversight.

(M* interview)

The view that the SEC was a much more responsible regulator and that its staff was more professional than the CFTC staff was related also to the way commodities, and the practices related to commodities trading were perceived at

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[76] Government National Mortgage Association pass-through certificates were known in short as GNMA's. The GNMA certificates gave their owners a proportion of an income generated by pool of mortgages. The certificates' payments were guaranteed by the Government National Mortgage Association, part of the Department of Housing and Urban Development, a fact that made the GNMA-based futures an attractive contract.

the SEC. To a large extent staff at the SEC showed toward commodity markets a similar attitude to the one was prevailing toward them among the securities community at the time: a condescending approach mixed with a feeling that commodities trading was a dodgy and not a completely respectable practice. For example, a senior member of the SEC's directorate for economic research described the attitude toward commodities at the SEC:

> Commodities were just... they smelled, you know. Commodities were really viewed like gambling. [...]. It's like saying: 'when people put those quarters in the slots, that is really an investment' and you [the SEC] got to regulate the casinos. I think it's a cultural thing.

(G* interview)

Such views toward the CFTC and commodities stood behind the motivation of SEC to distinguish its regulatory domain from that of the CFTC. However, since the CFTC was given exclusive statutory rights over regulation of all futures and since the definition of commodities was broadened as to include financial products, the statutory framework the once had separated the two regulatory fields – securities and commodities - was no longer in existence. Given this situation, the SEC's staff realised that in order to avoid the threat of having its regulatory domain taken over by the CFTC, the boundaries between the regulatory areas would need to be actively reconstruct. In the months after the amendment to the Commodity Exchange Act passed in Congress, the SEC's staff was promoting to the SEC's political layer – the commissioners and the chairperson – the message about the possible threat. Those efforts were successful and on December 10, 1975, Roderick Hills, the chairman of the SEC sent a letter to the chairman of CFTC suggesting that:

> Both the CFTC and this Commission should be concerned, not with bare questions of jurisdiction, but with a number of important questions relating to the integration of our capital markets [...]
>
> Can a meaningful distinction be drawn[...] between securities options [...] and futures contracts [...] and if so, what is it?

(Hills 1975)

The demand to start a process in which the distinction between securities-based contracts (options) and between futures comes from the fact that the SEC, being the bigger, older, and better established of the two regulators had more to lose in

a regulatory battle with the newly formed CFTC over control. Therefore, the SEC staff suggested promoting a policy of 'conceptual distinction'. The SEC claimed that each agency should define its products in a way that would not overlap with the other agency's statutory definitions. The CFTC, on the other hand, had potentially much to gain from a blurred distinction between securities and commodities. The broad definition that commodities received could potentially bring under CFTC jurisdiction to many new products that were proposed at the time. Following that agenda, R*, who was lobbying for the CBOT chose all-inclusive phrases to define the proposed CFTC's regulatory realms, as long as those definitions did not clash directly with the SEC's territory:

> I was looking for something that I thought would capture everything that one could think of and did not include securities [...] I could not say securities because it would have alerted the SEC. So we used this phrasing and crossed our fingers and hoped that the courts will see it as broad enough, which they did.

R* interview)

The two approaches – that of the SEC trying to create a distinction between 'its' products and those of the CFTC, and the CFTC's approach that pushed for as broad a definition for commodities as possible – were manifested in a long chain of 'border incidents' between the two regulators. The 6 years that followed the amendment of the Commodity Exchange Act saw many applications for futures contracts that were based on financial assets, contracts that could be interpreted as being securities. In several cases, securities exchanges sued commodities exchanges for trading futures contracts based on financial futures, claiming that the futures contracts were actually securities in disguise and that the futures exchanges were illegally expanding their trading territory, at the securities exchanges' expense. The SEC and the CFTC usually provided advice and support to 'their' exchanges that were involved in cases, but mostly remained out of the courtrooms themselves. One exception was a court case related to the GNMA-based contracts mentioned earlier. CBOT traded GNMA futures since 1975 with considerable success. In 1981, there were approximately 2,293,000 sales of the contract, each representing $100,000 in unpaid mortgage principal

(US Court of appeals, 7th circuit, 1982: 25,719). In early 1981, the CBOE submitted an application to its regulator, the SEC, to trade options on GNMA's. The CBOT, fearing that options on GNMA's would compete with its lucrative futures contract, sent a complain to the SEC and when, later on, the SEC approved CBOE's option contract, the CBOT filed a petition at a Federal court of appeals. The GNMA's case brought the two regulatory agencies into a direct confrontation in court. The court case resulted in a call by one of the judges for commencement of negotiations between the two parties:

> I did not appreciate seeing two federal agencies expend their time and resources fighting a jurisdictional dispute in court. I believe their efforts would be more wisely spent in utilizing their expertise to reach a solution, which they would jointly recommend to Congress.

(Judge Campbell, US Court of appeals, 7th circuit, 1982: 25, 737).

The GNMA court case was important because it brought into the open the fact that the financial regulatory 'space' was regarded as a scarce resource and that this situation contributed to the development of conflicts.[77]

The Shad-Johnson discussions and index-based contracts

GNMA's case and the regulatory struggle that it exposed practically forced the SEC and the CFTC to start negotiations over the future shape of financial futures markets and options markets. As this section shows, the negotiations that started as an attempt to settle the inter-regulatory turf war turned out to be a facilitating process for the creation of markets for index-based financial contracts. On their own indices were merely mathematical abstractions that served as indicators of the markets' situations. However, when incorporated into financial contracts, like futures or options stock indices could serve as a useful market tool. For example, a contract that would grant its owner, say, 25 dollars for each index point below a certain value at a certain date could serve as a safety net for investors. By using such contracts traders one could defend their holding against sudden drops in

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[77] The judicial outcome of that case was that GNMA options should not be traded in CBOE.

prices. Similarly, a contract that would pay 25 dollars for each index point above a certain value would make a good device for profit-seeking traders who hope to gain from increasing prices. Index-based contracts would also have a significant advantage over contracts like stock options. Stock options were written for specific stocks and one would have to own a specific stock (or have an intention to own that specific stock, in the case of a put option) in order to be able to enjoy the benefits of the contract. On the other hand, index-based contracts, because they were based on a more general 'prices generator' – the index – were less specific. That meant that as long as a trader's portfolio was co-ordinated with the movements of the market in large[78], a contract based on a market-wide index would cover her positions.

The general nature of index-based futures made those contracts attractive for the exchanges as well. Indices would make a practically infinite source of underlying 'assets'. As mentioned in the introduction, the number of stocks that were approved by the SEC to be used as underlying assets for options was limited. Therefore, as option trading became more popular,[79] competition among option exchanges for available stocks increased and so did the motivation of futures exchanges (regulated by the CFTC) for the approval of index-based futures. In addition, index-based futures allow the exchanges to write one type of contract per market-wide index, instead of writing contracts on many individual stocks. As seen in chapter 5, maintaining a large catalogue of derivatives was a burdensome task that added immensely to an exchange's administrative toll. Each contract had to have a variety of expiration dates and strike prices (the price of the underlying asset at which the contract would be exercisable). Moreover, for each different contract there existed slightly different clearing parameters that had to be activated when the contract was traded.

Being such a promising product, the idea of trading index-based derivatives was

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[78] Since the 1950s the theory of portfolio diversification gradually gained popularity among market participants. Starting with Markowitz influential book (1959) through the more elaborate (and hugely popular) 'market-line' ideas of Sharpe (1970), leading to the formation of the CAPM theory, the notion that portfolio should replicate the market's movements became a cornerstone of the common practitioner's education.

[79] In 1973 options were firstly traded in an organised exchange (CBOE). Five years later options were traded in 8 other SEC-regulated exchanges.

discussed in the futures trading community for several decades before the heads of the CFTC and the SEC started their negotiations.[80] However, a prominent cultural and regulatory obstruction stood between the exchanges and index-based contracts – the fact that contracts based on indices could not refer to delivery of goods. Since 1851, agricultural futures traded on the CBOT included a clause that demanded a delivery of goods from one party to the other one. That clause represented the contracts' original intention - to ensure the delivery of agricultural products and thus to minimise risk for both the producer and the buyer of those goods. However, since there were potential profits to be made through the trading of futures contracts, there were as many speculators trading on CBOT, as there were *bone fide* risk-hedging farmers and merchants. [81] In Chicago speculating on futures became so popular that people outside the CBOT starting doing it as well. In 1890s Chicago, shops who sold contracts that were based on prices of commodities futures, originating from the CBOT's trading floor became very popular (Fabians 1990). For the CBOT those establishments, commonly known as 'bucket shops', were a significant source of annoyance. First, the bucket shops were piggybacking on information that originated from the CBOT (where the prices were determined) and offered no compensation for that service. Second, by betting on commodities futures' prices the bucket shops were essentially taking customers from the CBOT and thus were denying commissions to CBOT members. During the last years of the 1890s and the early 1900s, CBOT went on a fierce legal battle against the bucket shops, at the end of which, after several landmark court cases (Ferris 1988) the operation of those was made illegal and was terminated.

The main argument that the CBOT used in its legal struggle against the bucket shops was that futures contracts that did not include specific conditions for the delivery of goods, and were therefore settable only through the payment of cash (cash-settled contracts), were essentially betting in disguise of a commercial

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[80] One of ideas that the CBOT's research team in the late 60s had was to trade futures on the Dow Jones. That idea was short-lived because the team's attorneys advised not to investigate any time and efforts into that idea because it would not pass a clause in the state of Illinois' gambling law referring to cash-settlement (C* interview).

[81] In fact, there were probably many more speculators than hedgers because, as mentioned earlier, it was estimated that less than 5% of the contracts were settled in delivery.

activity. The carefully constructed CBOT's argument struck a chord with anti-gambling emotions in the American society (Fabian 1990) and as a result, the association between cash-settlement and gambling did not remain limited to institutions like the bucket shops, but was extended, at least implicitly, to all other possible cash-settled contracts. A lobbying effort of the CBOT also brought about a change in Illinois' gambling laws (shortly followed by a number of other Midwestern states) forbidding the trading of cash-settled contracts - contracts that were not settable by delivery (Cronon 1991). In addition, the notion about the similarity between cash-settlement and betting, used in its wider form, was used in arguments against the trading of financial contracts and even against the immoral nature of financial markets in general.[82]

Cash-settled contracts and the inter-agency discussions

After 1974, the gradual expansion of contracts based on financial products brought back to the fore ideas about cash-settled contracts, in the form of index-based contracts. By the end of the 70s both futures exchanges and options exchanges were encouraging their respective regulators to act in order abolish the 'delivery of goods' demand from Federal and states laws so that trading on index-based contracts could begin. The SEC saw index-based contracts as an additional potential threat to its regulatory domain on top of the threat that came from the CFTC's exclusive jurisdiction over futures. Stock indices followed the stock prices and so, it was assumed at the SEC, futures based on indices could possibly serve as a substitute for stock and stock options. Worse yet, it was plausible that if index-based futures would come to exist, their regulator would be the CFTC – a regulator that the SEC always regarded with much suspicion. H*, who was a senior SEC staff member at the period describes the SEC's concerns:

> The synthetics, the ability to create synthetic stock positions [through the use of index-based contracts], was a concern to the SEC from the

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[82] For example, bucket shops were mentioned in the Congressional debates in the early 1930s that led to the establishment of the SEC (Shapiro 1984).

> point that there should be either a complete jurisdiction by the SEC or at least SEC ability to impact the products.

(H* interview)

'SEC ability to impact the products' would have meant a joint regulation of futures by both the SEC and the CFTC. Such a scenario was unlikely to happen for two reasons. First, the 'exclusive jurisdiction' clause in the statute explicitly granted the CFTC authority over futures and, given the fierce tuft war regulatory competition between the two agencies, it was not plausible that would give up its authority and give it to its rival agency. Second, R*, the CFTC chairman at the time strongly objected to joint regulation:

> I would have given it up [letting the SEC regulate index-based futures] before going to joint jurisdiction because I'm a firm believer in the 'one regulator' principle.

(R* interview)

Being aware of the situation, John Shad - the chairman of the SEC at the time - realised that although the SEC was the more reputable and well-established of the two if index-based were to be approved the SEC was either going to reach a settlement with the younger, less established CFTC, or risk losing the promising field of index-based contracts.

In spring 1981, while the GNMA case was still discussed in court, John Shad and Philip Johnson were appointed as the chairs of, respectively, the SEC and the CFTC.[83] According to Johnson, even before he came to Washington he contacted Shad and they both agreed to meet and discuss the overlapping regulatory areas of the two agencies (R* interview). The two regulators knew that the issue of cash-settlement needed to be resolved so that discussions about the structure of regulatory authority over index-based contract could begin. As described below, in spite of the rivalry between the two agencies, both agencies' negotiation teams knew that the cash-settlement issue should be solved co-operatively. H*, who was involved in the discussions, described SEC's the situation:

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[83] Sadly, John Shad passed away in July 1994 so interviews with him for this research were not possible. The material in this chapter includes interviews with several high-ranking SEC staff members who took part in the discussions between the SEC and the CFTC, as well Phillip Johnson himself and other CFTC staff members.

> [We r]ecognised that our legal positions were less than strong. [...] The SEC dealt with a very weak legal hand

(H* interview).

Although solving the cash-settlement issue was essential, tackling the subject was difficult. Morally the issue posed a dilemma: how could the heads of the two most important financial regulating agencies in the US suddenly decide that cash-settlement was different from gambling, after their agencies have been condemning the practice since they were formed? Furthermore, making an argument against the decades-old and deeply engraved anti-gambling concepts, even before any amendments were brought to Congress, would surely have created conflicts between the two agencies and some of the more conservative states, which had laws against cash-settled contracts (H* interview).

Fully aware of those potential problems, Shad and Johnson considered a different approach to the cash-settlement issue. Instead of avoiding the moral problem, they imagined a scenario in which index-based contracts would allow deliveries. In such case, if sellers of index-based futures would want to exercise their contracts futures and make deliveries of the underlying assets they would have to buy the stocks that composed the index that underlined the contract. Considering that indices are composed of any number of stocks ranging from 30 (Dow Jones) to a few hundreds (Standard and Poor's 100 or 500), and also that many series of futures would expire at the same date, deliveries of the underling assets, as the existing laws demanded, would results in a sudden demand for stocks, leading to a sharp surge in prices. Shad and Johnson understood that even if a fraction of index-based contracts would be settled by delivery it may still bring about extreme volatility in securities markets, a that situation that Shad, the chairman of the SEC, wished to avoid:

> We also decided that any index should be cash-settled. We didn't want this want this great flood of demand for stocks... He [Shad] didn't want it. He had this notion of 'witching hours' in the options markets, triple witching hours. He said: 'I don't need this kind of thing over here in the stock index side and I don't think my guys [SEC staff] care so let's just cash-settle everything.'

(R* interview)

The 'witching hours' R* referred to were the last trading hours before the

expiration of stock options. Unusually high demands for stocks were recorded in such 'witching hours' as well big sales of other assets. Such phenomena were unexplainable by the market 'common sense' that was valid in ordinary days, hence the term 'witching hours'. Such phenomena were especially strong when 1-month contracts, 3-months contracts, and 6-months contract were to expire at the same day, which is the source of the term: 'triple witching hours'.

Shad and Johnson's seemingly simple simulation exercise exposed the full meaning and consequence of the paradigm shift that financial markets were about to undergo. Shad and Johnson showed that the 'real assets' world and the 'synthetic assets' world were incompatible (p. 22). According to the 'real assets' worldview, the absence of a delivery clause from financial contracts meant that those contracts were practically equal to betting. On the other hand, in an environment where index-based contracts are traded, a delivery clause in the contracts would be equal to calling for a market crash. Therefore, what was considered moral in the 'real assets' world became unbearably dangerous in the world of synthetic ones.

This conceptual reconfiguration of the meaning of cash-settlement could be seen as an example for a creation of a new 'language game' (Lyotard 1984) - The two regulators created a constitutive language act (Barnes 1983) and by so doing, by assigning a new discourse to the situation they resolved a century old concept. Namely, by connecting the trading practice of buying and selling 'concrete', individual underlying assets with the new index-based contracts, the practice was denounced as irrelevant and dangerous. In effect, the new conceptual interpretation created a new trading practice for the markets. Having said that, it has to be noted that the constitutive process was not unidirectional – the new language that the regulators used was created in the new market environments in which financial futures and options were traded. Shad and Johnson were able to use the notion of 'witching hours' as a discursive tool in their discussions because such phenomenon had existed in organised options markets for several years before they met. Actors who traded financial futures and options created a new environment, which constituted a new lingual and communicative medium that was used later by the regulators.

Broadness of indices and the maintenance of the conceptual distinction

The interpretation given to the cash-settlement issue showed how the regulators created the conceptual and statutory frame on the basis of which the exchanges later developed index-based contracts. However, the analysis of the events that led to the agreement between Shad and Johnson reveals that the continuous shaping process was responsible for more than merely creating opportunities for the exchanges – the very nature of the new financial products was determined through the regulatory debate. Again, as in the pervious section, the main platforms for that the shaping process used were the different interpretations, and the different layers of meaning that the regulators and the exchanges gave stock indices.

The discussions between Shad and Johnson that started in summer 1981 resulted, in early 1982, in a regulatory taxonomy for index-based contracts – a taxonomy that was based on the broadness of the indices. Before index-based contracts became feasible, indices were seen as indicators of the market in general. Therefore, their broadness was related to their ability to describe market behaviour, or aspects of it – the more stocks were included in the index, the broader it was, and the better it reflected movements of the market as a whole. Similarly, industry-wide indexes were designed to reflect movements of segments of the market (e.g. energy companies, electronics, etc). However, when index-based contracts became a realistic possibility the broadness of indices was seen in a different light. For the exchanges, the broadness of indices was seen as a possible indictor of the contracts marketability. The broader an index was the more potential buyers would be attracted by a contract based on that index. On the other hand, for the SEC, as seen below, indices' broadness concept was used actively, first to indicate their regulatory territory, and then to actually create a conceptual distinction (or, a safety distance) between their realm and the

CFTC's.

While the exchanges saw an excellent opportunity in indices, at the SEC they regarded as a mixed blessing. The SEC wanted to regulate index-based contracts, but at the same time did not want the new products to eat into its existing regulatory territory. In particular, contracts based on narrow indices were perceived as a threat. While broad indices were aimed at representing the movements of the market in general (e.g. Dow Jones Industrial Average, Standard & Poor 100 and 500), narrow indices represented the movements of particular segments the market (e.g. indices that showed the movement of certain groups of stocks). The SEC's concern about narrow indices was related to a possible replication of stocks by index-based contracts. A futures contract based on an index sufficiently narrow so that it would closely replicate the movements of a single stock could potentially be used as a substitute to stocks or to stock options. For example, a volume-adjusted high technology index that would include, say, Microsoft and 19 other small high technology firms would practically follow the movements of the Microsoft stock. Since the SEC regulated stocks and stock options, the agency saw the possibility of trading futures based on narrow indices as a threat to its regulatory territory.

In order to better understand the views that John Shad and the SEC's negotiation team held with regard to the index broadness question it would be useful to look at a certain issue that was raised in the discussion – the possibility of approving the trading of single-stock futures. Conceptually, single stock futures stand at the narrowest end of the broadness-narrowness continuum: single stock futures would grant their owner the obligation to buy or sell a set amount of shares of the same kind for a set price at a set date. At the time of the Shad-Johnson discussions single-stock futures were not traded in any organised securities exchanges, and Johnson raised the subject of approving such contracts to be traded in futures exchanges:

> He [Shad] thought they [single-stock futures] were too close to stock options and that he had have to them. I can't say he ever said this out loud, but I think that he was concerned that if he lost the fight over single-stock futures he would sooner or later lose stock options. [...]

> He would have gone to war over this issue. [...] he had to accommodate his staff that was always extremely aggressive on jurisdictional matters and he thought that he would be crossing the line with his own people if he gave up single-stock futures.

(R* interview)

The single-stock futures issue helps to illuminate the importance that the concepts of indices' broadness and narrowness had in the regulatory shaping process. The SEC and the CFTC were trying to maintain a dual balance between similarity and difference. Each regulator was working at maintaining a similarity between its statutory regulatory definitions and 'its' contracts in hope that a strong association would emerge between the two realms.[84] At the same time, each of the regulators were careful not to allow the definitions that helped in making the association between its laws and the contracts in the market to be too similar to the ones used by the rivalling regulator. Maintaining this dual balance of similarity and difference was crucial for the regulators in order to hold on to their regulatory domains while the markets were undergoing substantial changes. The CFTC needed to show that the new index-based contracts could still be seen as commodities and the SEC needed to show that stock indices were related enough the securities world so that it will still have regulatory authority over them. The presentation of index-based contracts made this balance between similarity and difference harder to maintain. Had single-stock futures been approved, the carefully balanced conceptual differences between the SEC and the CFTC, the differences on which the legitimacy of the regulatory structure was dependent, would have been jeopardised. The solution was to dismiss the case that crossed the definitional boundaries, and not to allow the trading of single-stock futures contracts.

The case of single-stock futures also exposed again the fundamental mistrust that SEC's staff felt toward the CFTC. Single stock futures were indeed a threat to the uniqueness of each regulator's turf, but there was also another element in action behind the decision not to approve single stock futures: the SEC's staff believed that the CFTC's regulatory mechanisms were not appropriate for managing such a potentially influential contract:

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[84] For an elaborated discussion about the concepts of similarity and difference see (Barnes 1996)

> [T]he compromise was that a product that would have such a direct influence on an individual stock should not occur until there was a more effective jurisdictional environment.

(H* interview)

The more general case of index-based contracts shows that the two regulators defined the index broadness concept in such a way that the distinction between them would be maintained. The first step in that process was the divide indices into two categories – broad and narrow. As discussed in more detail below, the CFTC was given permission to regulate contracts based only on broad indices and, both agencies agreed that the indices that would be used should be broad enough so that manipulation of the contract prices by trading the stocks comprising the index would be extremely hard to perform. The prices of index-based contracts could be manipulated by influencing some or all the stocks that composed in the index. Such manipulations would have been relatively easy if the index was narrow – that is, if it was composed of a small number of stocks – and if those stocks were not traded in large volumes. However, if the indices on which the contracts were based were sufficiently broad (e.g. the Standard and Poor 500, based on 500 separate stocks) such manipulation would require amounts of capital that would render a manipulation operation virtually impossible.

According to the initial agreement that Shad and Johnson reached, the CFTC would determine whether an index was broad enough to have futures based on it and the SEC would only have an observer status in the matter. However, this part of the agreement uses vague terms such as: "the [chosen] index should be based on a widely published index or on a substantial segment thereof" (US Congress, 1982) allowing interpretative space to the determination process. R* explains:

> You see how it begins to become very foggy toward the end [of the document]. Well, that was all very intentional, because the more we talked the more both of us became concerned that if we get too explicit we were concerned that we might, inadvertently, disqualify products that should certainly be allowed to trade.[...] We ended up saying: 'we're not smart enough to know who's gonna come up with a product that should pass [...] and we were gonna write out [...] simply because we're being too precise. So, we got into all this mooshy language about 'substantial segment' or 'similar measure'.

(R* interview)

Since it was expected that index-based contracts would grow to be a considerable segment of financial markets, it was a joint interest of both regulators to open the field to potential innovations and therefore the loose definitions in the agreement. However, the agreement's vague terms also created a potentially indistinguishable 'zone' in the regulatory terrain between the SEC and the CFTC. Namely, because the agreement did not state explicitly the degree of index broadness that was allowed, it was open for the CFTC's deliberation to decide which indices will be used and which will not.

Shad agreed to this compromise, but the SEC's staff was less than happy about it. H* describes the feeling among the staff at that time:

> Shad was less militant [than his staff] and he wanted to find a mid-point here. [...] It's probably safe to say that they [the two agencies] would not have managed the accord without Shad.[...] [T]he SEC's staff's preferences would have been to not permit futures on indexes or any equity futures.[...] Did the staff want it? No.

(H*interview)

Shad's position would be better understood if the SEC's general set of circumstance is examined. R* explains:

> His [Shad] principal focus, however, was not on me; it was on automating the securities registration filing system, what's now referred to as the EDGAR system. And that's really where he wanted to go. He wanted to streamline the operation of the SEC. This stuff between the SEC and the CFTC was more a distraction and annoyance.

(R* interview)

Many at the SEC's staff, however, believed that the regulation of index-based contracts was a matter of principle. Namely, stock indices originated from stocks, and stocks resided in an undisputable SEC regulatory territory. The compromise according to which the CFTC could approve indices for futures contracts was regarded with much uneasiness among many of the SEC's senior staff and they thought that it should be changed.

> They [SEC staff] seemed to be of a mind that if a security was involved, the SEC should play a prominent, if not a dominant, role in its regulation. They did not warm to the idea that because it's traded as a futures contract that should make any difference at all. Although I kept pointing out to them, I kept saying that if I made a livelihood

> trading stock index futures contracts I would go to my grave without ever owning a single share of stock.

(R* interview)

Although Shad and Johnson reached an agreement that allowed the CFTC to choose which indices to approve as basis for futures contracts, the agreement still had to be approved by Congress so that it would be enacted into law. This circumstance gave the SEC an advantage over the CFTC because the SEC had a wider support in Congress than the CFTC: "there was a substantial amount of Congressional sympathy that allowed us [the SEC] to push something through" (H* interview). The Congressional 'sympathy' was manifested in a support that the SEC's Congressional oversight committees gave to an SEC's staff proposal to grant the SEC veto authority over proposed index-based futures. This version of the agreement, which included an SEC veto authority, was the one was turned into law.

The argument that was given in Congress for the decision to grant the SEC the veto authority was that contracts based on narrow indices might be used for manipulations of the securities market and therefore should not be allowed to trade. If this argument was the only guideline that the SEC used to determine in which cases to activate the veto authority then it could be expected that the agency would veto only contracts that potentially presented risks to the market system in general - systemic risk. In fact, examination of cases in which index-based contracts were proposed by exchanges revels a more complex picture. Although the veto authority was legitimised by a 'systemic risk' argument, the authority had implications for the inter-agency field. Namely, the SEC was granted the authority to decide which indices were broad enough to be used in futures contracts – CFTC regulatory domain – and which were too narrow and should therefore be kept outside the CFTC's domain. In practice, the veto authority gave the SEC the ability to use the concept of indices' broadness to maintain and strengthen the distinction between its regulatory domain and the CFTC's one.

Examination of many of the veto decisions given after the Shad-Johnson accord

was enacted gives evidence for the boundary work that took place and through which the distinctive regulatory domain of the SEC was maintained and enhanced. For example, in November 1983, in an SEC veto letter that rejecting a proposal to trade futures based on several S&P indices (the proposal was made by CME) it is said[85]:

> The requirement [about the index broadness] also restricts the field in which financial products might compete, not on an economic basis but based on regulatory differences between the futures and securities markets.

Here it is emphasised that although the contract in question may be economically different from the ones regulated by the SEC, the determining factor in the decision whether to approve it or not is the existence of a sufficient 'regulatory difference' between contracts regulated by the two agencies. The argument implicitly proposes a transformation in the function that the indices are expected to perform once they are put in this unique regulatory context. While before indices merely reflected the market reality, now the indices constitute a reality. The operation of the veto authority ensured that the SEC approved only futures contracts that were based on distinguishably different indices the ones used its regulated contracts.

The constitutive nature of the boundary work that was embedded in the Shad-Johnson accord had another layer of influence in it that went beyond the exchanges. Specifically, it would not have been desirable, from the SEC's point of view, to approve futures based on indices that were statistically different from 'their' indices if market participants would not be able to notice the differences and therefore might choose the CFTC-regulated contracts. In particular, it was important for the SEC that investors would be able to distinguish between the contracts based on the different indices; otherwise, the investors may decide to choose an index-based future over a seemingly similar SEC-regulated product:

> While examination of statistical correlations of price movements in the index and related stocks is relevant [...] , [t]he SEC's primary

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[85] Letter from George Fitzsimmons, general secretary office, SEC to David Horner, director, Economics & Education, CFTC, Re: the application of the CME for designation as a contract market for: S&P Energy Index future, S&P High Tech Index future and the S&P Financial Index future, November 29, 1983. (SEC reading room, special request for files)

> concern is that broker-dealers [...] and their customers may perceive price movements in an index to be sufficiently close to movements in an underlying stock for the index [based product] to be sold as a surrogate [for SEC-regulated contracts].

The practical implication of the boundary making process at the investor level was that investors were channelled to the separate futures or 'securities-related' markets according to the broadness of indices on which the contracts were based. In many cases, channelling had resulted in an expansion of the SEC regulatory area. For example, the contracts that were vetoed in the letter mentioned above were based on industry-specific segments of the S&P index: those were the S&P Energy Index, the S&P High Tech Index and the S&P Financial Index. Shortly before the SEC vetoed the futures based on CME's application, it approved two options contracts 'relating to the gas and oil industry' that were 'very similar to the S&P Energy Index' (Securities and Exchange Commission, 1983). In general, it can be seen that the broadness criteria and the veto authority that was based on it in effect created new regulatory territory for the SEC.

Discussion

The discussion is focused on two main areas. First shows how the empirical material supports the theoretical assumptions about the differential network of markets and how it helps to find new insights about the complex process through which such networks develop and operate. Second, the discussion will show the contribution of findings and the analysis to the growing field of the sociology of financial regulation.

As shown in the chapters 6, an integral part of the shaping of options markets revolved around the establishment of a set of communicative procedures that actors in the markets accepted and embedded into their practices. The creation of such procedures and their inclusion in the market practices changed the topology of market networks in more than one way. Namely, market participants did not use common communicative medium only to facilitate cooperation, but also to emphasise and maintain the differences between their practices between the ones being performed by others. The common concepts were thus used as platform for the expression of distinctive interests of the different agents that operated in financial markets. The notions of reconfiguration and realignment can help in offering a more detailed and sophisticated description of the processes through which the market develops. The narrative describes how the Shad-Johnson accord created an institutional infrastructure for the maintenance of the conceptual boundaries between the two regulators. As the chapter shows, this was done by reconfiguring two connections in the market network of financial contracts: the connection between commodities trading and gambling, and the connection between indices and market activity.

First, the materialisation of cash-settled contracts was impeded by the connection between trading of contracts and gambling. This connection was based on the particular cultural, legal and organisational contexts embedded in the notion of delivery. As shown in the chapter, the assurance of delivery of the underlying assets was one of the motivations for the development of futures contracts in the

mid 19th century. Therefore, although the commodities traders gradually developed practical market patterns that practically disregarded delivery, the notion became institutionalised in numerous spheres. Most importantly, the notion of delivery was embedded in a larger cultural sphere that equated gambling with commodities trading and designated a negative moral value to both practices.[86]

As the material shows, the CFTC and the SEC did not did not simply 'severe' the ties that connected commodities to gambling. Instead, the regulators took the notion of delivery, which existed in a moral context, and placed it in a practical context. By doing so, they exposed the practical roots of the moral claim. The implicit justification behind the ban on cash-settled contracts was that trading of such contracts might be used for wagering-like activities instead of productive activities like securing the delivery of commercial goods. In contrast, in the markets of the early 1980s the practical meaning of delivery had long vanished from the vast majority of the transactions. Instead, the markets' practicalities showed that delivery of the underlying assets might have led to extreme price volatility and even to crashes. The specific techno-social nature of financial markets (e.g. indices based on hundreds of underlying stocks and 'witching hours) practically demanded that the obligation to have a delivery would be abolished.

Second, the mathematical context that underlined the notion of index's broadness was translated into a connection between broadness of the indices and the regulatory identity of the contracts. However, in this case it was the political structure in which the market network was embedded that provided the translation ability. The Congressional committee that decided that the SEC and not the CFTC should have the ultimate decision power over broadness of indices in fact realigned the connection between indices and the markets. The reconfigured connection included new actors: the two regulators. Therefore, the existence of this new connection meant that the broadness of indices was not

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[86] As shown in chapter 4, the negative regulatory attitude that the SEC had towards futures market was another representation of the same worldview, according to which futures trading is related to gambling and therefore should be regulated in a restrictive manner.

related only to ability of the indices to describe the market picture, but also to the identity of the regulator, and consequently, to the type of contract traded – futures or options.

This analysis can help in adding more details to the question of how financial markets develop. The material in this chapter adds to our understanding of this process by allowing us to focus the question of the formation of markets. Having read the case of the approval of index-based contracts, one may ask: who creates financial markets? As the analysis in this case shows us, the answer to this question is not simple. The regulators did not create the market for index-based contracts on their own because the options traders were the ones who developed the new conceptual meaning of non-delivery contracts (e.g. it was the notion of 'witching hours' that motivated Shad and Johnson to relinquish the demand for delivery). Similarly, it cannot be argued that the exchanges were the ones responsible for the creation of markets for index-based contracts because, as the chapter shows, critical stages of the creation process took place in organisational settings and contexts over which the exchanges had little effect. In this case, can the creation of index-based contracts be attributed to a successful cooperative effort? The case implies that both the exchanges and the regulators wanted to create a market for index-based products. Nevertheless, the material also shows that the financial products were shaped through continuous disagreement and conflicting agendas rather than through coordinated allocation of resources.

A possible answer to this question would be that the market network created index-based contracts. In other words, the network could be described as a case of distributed agency. This concept is taken from Marvin Minsky (Minsky 1986). Minsky argued that intelligent action should be conceptualized as a large system of agencies that can be assembled together in various configurations. Edwin Hutchins (Hutchins 1995) followed Minsky and expanded the concept to systems that include both humans and material objects. Hutchins showed that in a complex techno-social network the attribution of exclusive decision-making capacity to one actor would not be accurate. In such networks (Hutchins analyses aircrafts and boats), no single actor is the 'commander' while the rest are 'subordinates'. Instead, whole network of humans and machines makes the

decisions and performs the practices. In accordance, it can be said that the creation of markets for financial derivatives, a process that included a string of interpretations and decisions, could not be reduced to a simple 'action-reaction' narrative between the regulators and the exchanges. As the chapter shows, the connections between the differential actors were responsible for the transformative development of index-based contracts from general concepts to tradable products.

The analysis in this chapter also adds another layer of understanding to the larger scale historical process that the thesis describes. When the events in this chapter are examined in a broad perspective, the regulatory boundary making can be seen as an attempt to push back the realm of futures markets into a specific segment of the financial world. As described earlier in this chapter and in the chapters that describe the formation of CBOE, the pioneering markets that traded financial contracts transgressed the boundaries between the agricultural commodities world and the financial world. The CBOE's stock options (and to a similar extent the CME's currency futures) created a hybrid trading culture that was a synthesis of traditional agricultural commodities values and perspectives mixed with concepts that came from the securities world. Chapters 4 and 5 describe the exponential growth of the new financial markets, along with the significant part that the regulators took in this process. The Shad-Johnson accord and the following maintenance of the index-broadness distinction reintroduced a conceptual separation between the securities worlds and the commodities one.

The case of index-based contracts also adds a more comprehensive meaning to the concept of communicative mediums in financial markets. The previous chapter describes the development of model-based risk assessment systems and shows how both market participants and regulators interactively shaped the environment in which financial contracts were traded. Trading practices that employed model-based systems, created a communicative medium, a language, for the description and characterisation of risk. The acceptance of this language by the trading community was the basis for the inclusion of the models into the markets' infrastructure and into the regulatory mechanism. As the chapter shows, the regulators adopted and used the language that the exchanges created. This

acceptance resulted in a change in the regulatory structure - the way the SEC's net capital requirements were calculated. A similar process is described in this chapter. The SEC and the CFTC created the discursive-interpretative context through which cash-settled contracts were defined. This communicative medium, when translated into a statutory form, allowed the exchanges used to develop the new index-based contracts.

In conclusion, the findings in the paper highlight the potential for future research on the prominence of systemic risk took in construction of regulatory schemes. As seen in the previous chapter, a similar phenomenon occurred when the SEC included the TIMS risk assessment system into its regulations. TIMS was based on a pricing model that included the assumption that price changes in the markets distributed log-normally. Thus, the SEC practically accepted the model's implicit assumption about the probability of extreme price volatility events. By including TIMS into its statutory structure, the SEC was implicitly declaring that part of the agency's regulatory task was to help the markets minimise situations that involved systemic risk. In the Shad-Johnson case, the SEC and the CFTC along with the exchanges were referring to systemic market risk and to ways to minimise such risk during the interactive shaping process. The exchanges and the regulators contributed different components to the construction of the narrative about systemic risk. The approval of cash-settled contracts was based on the hope of the two regulators to avoid situations of extreme volatility in the markets: Shad and Johnson argued that settling index-based contracts thorough trading the underlying assets would probably bring about such situations of extreme volatility. The exchanges, on their part, provided the SEC and the CFTC with concrete examples of such situations that happened due to sudden surges of demand for underlying assets – the witching hours. Essentially, the build-up of common, descriptive narrative about systemic risk created a link between the regulatory field and that economic phenomenon. Therefore, although most of statutory authority of the SEC and the CFTC did not related directly with systemic risk, both regulators used notions related to that type of risk as part of their interactions with the exchanges.

Chapter 8

Conclusion

The thesis was aiming to throw light upon the question of process thrown which market networks evolved in the case of options markets.

The empirical material collected shows that options markets develop through a process of network making. As a result, the stability of the organisational institutions of the markets is dependent on the strength and efficacy of the connections made among the actors. As the historical narrative shows, the development of options markets was influenced by two main bodies of cultural knowledge – the culture of the commodities markets and the regulatory values of the SEC. In addition, the development of the market was related to an expanding set of market procedures that were based on options pricing models. The process of network making was affected substantially by the combination of these factors. Firstly, this chapter suggests that the strength of the connections, and consequently, the viability of the network that constitutes modern options markets were dependent on the ability of the actors to create interpretative links between the influential sources of ideological knowledge and the technical practices of the options markets. Secondly, the nature of the process through which the linking interpretations were developed is discussed, showing how the process changed the topology of the network and reconfigured the organisational contexts in which the connections in it were performed. This part of the discussion offers an initial conceptualisation of the nature of power in the techno-social network of financial market. Finally, the chapter will offer a direction for future research.

The origins of the ideological standpoints that were to play an important role in the creation of options markets could be identified, in one form or another, before the proposal to trader stock options in an exchange were discussed in the CBOT committees or by the staff of the SEC. Chapter 4 describes the evolution of the SEC's regulative worldview, which had existed as an influential factor before options markets were proposed, and indeed played a significant role in

their formation. Nevertheless, the detailed historical description of the regulatory approval process shows that the cultural views of the SEC about the desired structure of the markets were not simply applied to the new options market but instead the ideologies were interpreted and realised through a network composed of varied actors. For example, although it is undeniable that the concept of CBOE's competitive market makers was compatible with the SEC's organisational value of competition, the findings in this thesis reveal that the development and the realisation of the options market makers concept was not simply a representation of the SEC's ideological view. In fact, the design of the competitive market makers was influenced by multiple factors. The founders of the new exchange developed the market maker concept while taking into account the possible reaction of the regulator to the proposed liquidity supply mechanism. In other words, the CBOE's competitive market makers represented not the SEC's worldview but the way the SEC's worldview was perceived by CBOE's founders. Moreover, the desired effect of the proposed competitive market makers was to bring about a change to the political relations between the SEC and the founding team of CBOE. The continuation of the historical narrative shows that the recruitment attempt was successful. The SEC's staff did regard the proposed options market makers as a realisation of one of the organisation's core values and, indeed, the fact that CBOE was to have competitive market makers played an important role in the approval that exchange received eventually. This chain of events shows that options markets developed as part of the process in which the network of connections between the actors were established and not as material and organisational realisation of worldviews of the actors involved. To summarise, the history of options markets, as it is analysed in the thesis, shows us that worldviews and ideological standpoints were not only the initiators of the process through which financial markets were created, but to a similar extent the organisational meaning of the ideologies was created through the interactions among the various actors in the market network.[87]

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[87] This discussion is related to the concept of finatism as it was presented by Barnes, Barry, Bloor, and Henry (1996) who mention that: "In a sense we never know what our [...] term mean, however readily and unproblematically we can apply them, for we never know how they are going to be used. The use of our terms is open-ended; there is no definite class of things to which

The findings in the thesis form the basis for a more elaborate analysis about how the connections among the actors are formed and what are the mechanisms through which the market network is created. In essence, the thesis showed that as the connections between the actors institutionalised and formed a relatively stable network, the worldviews that the different actors promoted underwent a similar process of elaboration. For example, the notion of competition was expressed and became an effective factor in options markets through the developing connections between the SEC and the exchanges. Because of the wide recognition of the expertise of the SEC, regulatory consultation has turned into a process in which information was exchanged, rather than just being transferred in a mundane bureaucratic manner from the exchanges to the SEC. Due to this development, an important connection was established between the regulator and the exchanges. This connection, in turn, had an impact on the evolution of market structures and practices that expressed the value of competition.

The process described above in general terms encapsulates the fundamental aspects of the historical process in which options markets were created: an evolution of a network of connections among the market participants and an inseparably related development of practices that were performed through that network. This general conceptual presentation is related to another important aspect of the history of options markets: the development of norms in the techno-social network. The historical narrative that the thesis describes revolves around a two-fold process of transformation. One aspect of this process was the creation of the organised options exchange, during which the normative structure of the commodities markets' culture was reconfigured and new meanings were assigned to it. The other aspect in the process was the transformation that took place in the regulatory attitude towards options markets. By examining the two aspects of this process, the following section will scrutinise the concept of 'embeddedness' in the context of modern financial markets and will develop

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they already apply, no closed domain of application the boundary of which can presently be discerned." (p. 55).

initial theoretical concepts that incorporate the unique organisational attributes of these markets.

In order to expose the complex nature of the operation of norms in options markets, the discussion will firstly present the relations between norms and worldviews as if they were part of a hierarchical structure. When the historical narrative of the thesis is depicted according to this scheme, two initiating sources of influential worldviews can be identified that contributed to the development of the motivations of the various actors. First source is the Chicago commodities market's trading culture and the second one is the SEC's regulative worldview. Both worldviews served as sources for the development of values, norms, and practices through which the worldviews were aimed at being realised. In general, it can be said that before the evolution of the options markets, the practical and technical aspects of norms tended to be subordinated to the value-based aspects of them. As such, normative demands were presented as part of attempts to realise and maintain markets that were compatible with the ideological worldviews of the exchanges or the regulators. This political and organisational setting kept the two ingredients of norms – the practical information included in the norms and the value-based aspects of the practices – as an inseparable whole. In both the CBOT and the SEC, the unity of the practical and the value-based aspects of the norms were backed by the structural features of the organisations. At the SEC, it was the influential staff that preserved the compliance between the values of the organisation and the normative demands it produced. In the CBOT, the all-powerful members' committees provided the exchange with the formalised versions of norms and the close-knit community of traders, whose backbone was the structural connection between traders and their clearing firms, supplied the community with informal normative demands.

The evolution of the options markets brought radical changes to the way norms were performed in the developing techno-social network of connections. In order to analyse these changes it is necessary to revisit the cultural implications of the transfer from agricultural commodities to stock options. The analysis in chapter 4 shows that CBOE, the options exchange, evolved not as an extension to the securities markets of the time, nor as a non-agricultural version of a commodities

exchange. Instead, the analysed material shows that the exchange acquired unique characteristics: it developed as a hybrid of the cultures of the securities market and that of the commodities exchanges. The material shows that the core practices of options trading, like market makers, or clearing procedures, evolved alongside the creation of a new normative structure. The evolution of practices in the options markets showed that the connections between the practices and the bodies of cultural knowledge, from which the options market stemmed originally, become more indirect and tenuous. As discussed earlier in this section, the competitive market makers' concept embodied values that were held in high regard by the commodities trading community (for example, reliance on personal skills, prominence of the individual trader). Yet, the concept that later became CBOE market makers was developed and designed as a device that was aimed at gaining credit among the SEC's staff. Likewise, as the market makers' case shows, the acute need to finance the operation of the competitive market makers motivated the exchange to develop a rationale that was based on the Federal Reserve Board's credit rules and in order to do so, the practicalities of market making were designed so that they would comply with the definitions of the rules. Thus, while the practices related to the operation of the market makers were still compatible with the values of the commodities world (for example, the commitment of the individual trader to the exchange was expressed in the obligation to be involved in risky transaction), the actual content of the performed operations was gradually being associated with the rules of the Federal Reserve Board and consequently, with a mathematical model for the pricing of options.

This example reveals the beginning stages of a trend that has grown into a prominent factor in the development of the options exchange. The association that had existed previously, in the commodities markets, between the values from which the norms stemmed and between the practices through which the normative demands were performed, was replaced by a different structure. The analysis of the historical narrative shows that the unitary normative framework that had provided a context to the practices in the commodities markets was replaced by a dual structure. Whilst the cultural background from which the options exchange emerged was still effective in providing justification and

legitimisation for the performance of market practices, the market practices themselves, the procedures and the techniques, have gradually become dependent on other bodies of knowledge, such as the financial economics.

Following the discussion presented so far, it could possibly be concluded that before the development of options markets, the commodities trading culture was based on a rigid hierarchical structure in which all norms derived directly from a worldview. The empirical material in this thesis and the theoretical framework used to analyse it show that this was not the case and that a more complex historical process took place. In particular, it cannot be assumed that the market practices in commodities markets were only the result of a process in which broad values were being broken down to specific, case-oriented normative demands. As shown in chapters 4 and 7, for example, the history of the commodities markets was characterised by repeated attempts to discover new agricultural products that would be used as bases for contracts. This organisational pattern was embedded not only in the unique cultural background of the trading community, but to a similar extent, it represented the economic conditions in which the commodities traders operated. In order to secure a sustainable source of income the commodities exchanges needed to maintain high volumes of trading and this was attempted through a continuous search for new products. In other words, the normative demand that called for the development of new contracts, which was presented by the founders of CBOE as an integral part of an overarching commodities markets ethos, was not only a product of the Chicago culture, but similarly was related to the practices that developed in the markets themselves. Thus, the practices of commodities trading were the source for the development of institutionalised concepts and not only the fruits of such market institutions.

In spite of this duality, the findings that describe the transfer from the culture of the commodities markets to the options market show that the practical knowledge in the commodities markets was generally placed within a definite normative framework. For instance, chapter 5 shows that the procedural and technical knowledge related to commodities trading was maintained and transferred as an inherent part of the norms in the community. The

apprenticeship relations between the more established traders and the new-comers was based on teaching of trading skills that were embedded in a broader normative worldview (for example, which type of expenditure is appropriate at different stages of the trader's professional life). A tight connection between the value-based and the procedural aspects of the practices existed also at the SEC in the period before options markets started to operate. As chapter 4 shows, the organisational values of promoting competition and protecting the investing public had a significant influence on the regulatory reaction to the proposal to trade options in an organised exchange. Although the development of the competitive market makers was done by the CBOE's founding team, the constellation in which the idea was proposed and its consequential development were influenced greatly by the normative background of the SEC. Therefore, it can be said that the values of the SEC, albeit by proxy, framed the initial creation of the market maker's institution.

When the discussion above is placed in the context of the question the development of financial markets and in particular the effect that of the thesis: how do financial markets develop, it points at a possible explanation. The analysis shows that the development of the first options exchanges was based on a process in which the market was 'dis-embedded' from the cultural background of the commodities world. Granovetter (1985) claimed that the development of markets and the shape they take is dependent on the cultural and social networks from which they emerge. The empirical material in this thesis expands Granovetter's theoretical explanation, and suggests that the pioneering options markets developed through a gradual reconfiguration of the cultural and social connections between the commodities markets' culture and the structure and practices of the new market. It has to be stressed that the dis-embedding process did not mean that the new market was detached completely from its original cultural background and that its values and norms have become redundant or secondary. In fact, as the empirical material shows, many of the characteristics of the options markets could be traced back to cultural elements from the commodities markets. For example, the competition between the different options exchanges did not lack elements of local patriotism. Likewise, the fierce legal battle described in chapter 7, between CBOE and the CBOT over the

GNMA options, included references to the different 'cultures of trading' that the two exchanges represented. In contrast, the dis-embedding of the options market from the culture of the commodities markets refers to a more fundamental process. The thesis shows that the development of the options market depended on the emergence of a reflexive attitude among the actors towards the culture of the commodities market. The actors were not rooted in the market culture from which the options markets emerged originally, but instead reached a condition where they could choose which elements of the culture to use, for which needs, and to what extent.

This process of dis-embedding can contribute to our understanding of the conditions that led to the 'split' normative structure of options markets – the separation between values and practices – and the evolution of the options market in general. The unique constellation of political and economic conditions that surrounded the development of CBOE contributed to the fact that the exchange's founders began to see the culture of the commodities markets as a resource that could be used to realise the idea of the options market, and not as an exclusive prism through which the market was perceived. The fact that CBOE's founders treated their own market culture as a tool for the design and the construction of the new exchange was an influential turning point in the development of options markets. This perception allowed the founders of CBOE, and later other market participants, to see the new market not as an extension of the commodities markets, but instead as a new economic and organisational entity. This changed perception was manifested in, among other things, the creation of market practices that did not derive directly from the commodities markets' worldview, but relied on other bodies of knowledge. In summary, referring to their original market culture in a reflexive manner, allowed CBOE's market participants to adopt new types of knowledge more easily and use them as the basis for the development of market practices.

The dis-embedding of CBOE from the culture of the commodities markets also had significant consequences on the structure of power in the options market. Since the options market was no longer embedded in one all-embracing cultural background, the connections between the values and the practices, which in the

commodities markets were part of the taken-for-granted social and organisational reality, have turned in the options markets into negotiable and frequently contested associations. As discussed earlier in this chapter, the fact that the commodities' markets culture gradually lost its hegemonic status in the evolving options market did not mean that the values of that culture lost all of their influence, but that market techniques were no longer associated exclusively with those values. This situation had implications for the power structure of the options market. In the absence of an agreed set of rules that would define the relational positions of the organisational values of the commodities market, which previously had been dominant, and the new practices that were developed in the options market, it was necessary for the market participants in order to gain support for their proposed practices, to create and maintain the connections between the values and the procedures on their own. For example, chapter 6 shows that as model-based practices in options markets proliferated and became more sophisticated they gradually played a more central role in the maintenance of the normative order in the market. Model-based practices were used first for the design of trading plans, then for determining which traders' positions were risky for the clearinghouse and finally, to decide how risky were the traders who managed the public's investments. This progression shows that an increasing amount of political power and value-based judgements were gathered and exerted using model-based practices. Accordingly, it can be said that the ability to maintain connections between the practices and the ideological values has become a critical factor in the creation and establishment of power in the options market.

Following the conceptualisation presented above it can be said that the capacity to make influential normative claims in the options market, and to establish powerful positions in the market network, was correlated with the ability of the market participants to reconfigure, create and maintain connections between the value-based aspects of the norms and between the market practices through which the norms were to be performed. This description, on its own, would be very similar to explanations offered by researchers from the sociometric networks school, like Burt and Uzzi. In the case of the options market, however, such an explanation would cover only a partial aspect of the development of the

market. The sociometric approach provides a framework for explaining what happens when connections between the actors are created and market networks come together. This thesis, however, is aimed to expand this conceptual framework and to explain the process of network making not only from a structural perspective, but also to provide an analysis of action.

In order to give a detailed answer to the question of how financial markets come about it needed to refer to the actual process that takes place when connections between the various nodes in the network are established and maintained, and not only to the network-wide effect of those connections. The material in the thesis shows that the viability and strength of the connections between the practices and the values were dependent on the representations and interpretations that underlined the connections. Therefore, a schematic description that aims to explain the process through which networks are created cannot be reduced to a series of changes in the topological settings of nodes. The establishment of a viable connection within the market network is dependent not only on the realignment of organisational practices, but equally on a reciprocal change in the perceptual network of the actors. Other actors have to accept the normative validity of the proposed practices, and frequently to support them actively, in order for the connection to be established. The historical narrative that the thesis describes includes several examples for such a construction of normative order. For instance, the change in the formalised norm that banned the trading of non-delivery, cash-settled contracts was achieved through a reconfiguration of the connection between the norm and the market practices related to it. The negotiations between the SEC and the CFTC resulted in the production of a new interpretation to the association between the trading of the cash-settled contracts and the value that wagering should not be permitted in financial markets. The new interpretation that the regulators gave to the behaviour of options markets during the 'witching hours' exposed the limitations of the prior definition of non-delivery contracts, and by offering an alternative to this definition the two regulators formed the basis for a connection between the trading of cash-settled contracts and the value of the maintaining stable market conditions. Similar process took place when the SEC approved the use of TIMS for its net capital rule. The interpretive connection in this case was formed between the regulative

norms that called for the protection of the broker-dealers' customers and between the communicative practices that were based on use of the pricing models. As chapter 6 shows, the SEC approved TIMS largely because it provided a common descriptive language for the options markets' participants. Therefore, by providing a communicative layer for the description of risks, the human market participants and the non-human actors formed a connection that helped to reaffirm the relevance of the SEC's organisational values to the practice that were performed in the options market and, in so doing, to gain the support of the regulator.

In summary, then, the thesis suggests that a fundamental process through which the networks of connections of financial markets come into existence is the formation of interpretative links between the various sets of ideological concepts that are expressed and promoted by the actors and between market practices. The historical origins of this process are rooted in the need of the founders of the options market, in order to gather political support for their proposal, to refer to cultural elements of the commodities markets in a relational and calculative manner. Consequently, the institutionalisation of this process led to the dis-embedding of options markets from the culture of commodities markets and deconstructed the linkage that had existed previously between the normative and the practical aspects of market ideologies. The rising popularity of options markets, and the initial appearance of market practices that were based on mathematical procedures, served as the organisational and material conditions for the reconstruction and reconfiguration of connections into a new network. This network was constructed through an incremental process of gathering and redistribution of power among the various human actors, as well as the non-human ones. To conclude, if we try to answer the question of where financial markets come from, then this study tells us that financial markets develop through the gradual construction of networks of connections among a variety of actors. If the development of the market is successful then such techno-social networks maintain institutionalised connections between the practices performed in the market and the values and norms that legitimise those practices.

What further research does this perspective suggest? One area in the research that

could benefit potentially from the empirical and theoretical material of this thesis is the study of price volatility in financial markets. As mentioned in chapter 6, the predictions of prices produced by the Black-Scholes model were based on estimates of the future price volatility in the market.[88] The volatility of prices is dependent, among other things, on the efficiency of information transfer among market participants. For example, Baker's study (1984), which was mentioned in chapter 2, shows that the patterns of communication and trading in the options market were influenced substantially by the social structure that developed in the trading crowd. Smaller trading crowds, in which relatively large networks of frequent trading partners developed, tended to have lower price volatility than bigger crowds, where there were less 'regular' traders and traders, who usually preferred to trade with others they know, developed small, isolated, trading networks, which resulted in high levels of price volatility. Baker showed that the topological characteristics of social networks in financial markets play a significant role in determining price volatility.

Baker's research was in many ways a pioneering work in an area of study that is now known as 'microstructure' (Baker 1984a; Baker, 1984b). Studies in the microstructure of financial markets aim to find causal links between the organisational and technological features of markets and between the price behaviour in those markets. Unlike the approach presented in this thesis, which considers financial regulators and functionaries of the exchanges as actors of market network, microstructure researches tend to focus exclusively on the traders, while referring to others as part of the structural features of the network in which price are formed. The material in this thesis suggests that such a division between structure and action limits the explanatory scope that can be applied to financial markets. Accordingly, it is suggested that price volatility would be better understood and estimated more accurately if the variety of connections that make up the network of financial markets would be incorporated into the conceptual framework used to estimate volatility. This approach is of particular importance in the cases where volatility estimates are

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[88] See MacKenzie & Millo (2003) for a more detailed explanation about the estimation of volatility and its implication on practices in the options market.

fed back into the markets' network. For example, one of the important connections between the traders and the clearinghouse is performed through the charging of margins on the traders' positions. As discussed in chapter 6, this calculative process is done nightly in order update the levels of security deposits held by the clearinghouse. Since margins amount to a considerable part of the traders' net capital, it would be safe to assume that the level of margin deducted from the traders' account in the night would have an impact on their trading strategy in the following day. The fact that the clearinghouse charges margins from all traders means that the aggregate level of margins has an impact on the level of price volatility. However, since pricing models are used for the calculation of margins, and these use estimates of volatility, the actual market level of price volatility is determined according to its estimates. In other words, by referring to the techno-social connections between options traders, pricing models and the clearinghouse, the self-referential nature of price volatility is revealed.

Glossary

Call	See option.
Clearing	A technical and organizational process, through which options' transactions are filed, monitored settled. (margin requirements are calculated at this stage).
Derivative	A standardised tradable contract, (e.g. future or option), the value of which depends on the market price of an "underlying," asset.
Future	A standardized exchange-tradable contract in which one party undertakes to buy or to sell a set quantity of an asset (or a 'synthetic' asset, such as an index) at a set price on a given future date.
Margin	The sum (typically adjusted daily as prices change) that sellers of options or parties to a futures contract must deposit with the clearinghouse.
Market maker	In CBOE's early years (circa 1973-1985), a market participant who traded for his/her own account and is obliged to quote prices for option(s) for which he/she are responsible. While making makers a market maker was not permitted to execute customer orders.
Option	A contract that gives the right, but not obligation, to buy ("call") or sell ("put") an asset at a given price (the "strike price") on, or up to, a given future date (the "expiration").
Put	See option.
Short selling	Borrowing an asset, selling it, and later repurchasing and returning it.
Strike price	Strike price is the stock's market price from which the option becomes exercisable. For example, a call options with a $40 strike price would become exercisable when the market price of the stock would reach $40.
Volatility	The level of price fluctuations over a given time, commonly calculated as the annual rate of standard deviation of price changes.

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